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Elk Horn Coal Central Cleaning Plant See p. 61

CONTENTS

Mechanization Overcomes Adverse Conditions at Nellis	47
Modern Architecture Enters Preparation-Plant Field	50
National Coal Association Maps Legislative Course	53
Storage-Battery Haulage Makes Good at Reading Mines By R. DAWSON HALL	57
Elk Horn Builds Central Cleaning Plant at Wayland	61
Market and Research Needs Spotlighted at Pittsburgh	67
Reliance Modernization Keys Mine to Mechanization	69
Anthracite Rehabilitation Mulled Over at Harrisburg	86
West Virginia Sponsors Coal-Combustion Conference	92
Safety Council Reviews Accident-Prevention Progress	98

- What makes an outstanding mining property? Next month Coal Age again will answer that question with its Seventeenth Annual Model Mining Number featuring the operations of the Bell & Zoller organization in Illinois. Here is a story of mechanization nation of every phase of the operating and maintenance cycles told in detail in a series of special staff articles.
- Judged by older standards, the Nellis mine was hardly a hot prospect for mech-anization. Low coal, nearly two feet of drawslate, a hard bone parting and some local grades exceeding 14 per cent shadowed the picture. But management refused to be discouraged; instead, it decided to lick the problem. The results achieved are described in the story beginning on page 47 of this issue.
- Preparation plants, declares W. F. Barnes, need not be unsightly or dirty. That the claims made in the article on page 50 are neither fanciful nor uneconomic will be demonstrated in a story scheduled for January publication describing a dry-cleaning plant in the Pennsylvania bituminous coal fields where the goal of construction which eliminates free dust has been reached in actual practice.
- Associations have been very much in the limelight the past month. So, in addition to the National Coal convention stories on pages 53 and 67, this issue also includes reports on West Virginia's first coal-combustion conference, National Safety Council, West Virginia Mining Institute and the Illinois Mineral Industries Conference. These latter reports appear in the news section, which starts on page 83.
- Old timers can remember when slack coal was a waste product and mines paid the railroads to haul it away. No better illustration of how far the industry has outgrown that day could be found than the new plant of Elk Horn Coal at Wayland, designed to specialize in stoker-coal preparation and ultimately handle 12,000 tons per day. Turn to page 61.
- Coal Division members of the A.I.M.E. met with members of the Fuels Division of the A.S.M.E. in Pittsburgh late last month to review their common problems. And on Nov. 5 the Illinois Mining Institute holds its annual winter meeting at Springfield. The high spots of both gatherings will be cov-ered in special reports which will be pub-lished in our December news section.

Editorials 45 Notes From Across the Sea... 72 On the Engineer's Bookshelf.... 73 Operating Ideas 75 Word From the Field 83 New Equipment 122 COAL AGE is published monthly on the 1st. \$3 per year in the United States, Canada, Mexico, Central and South America; other countries, \$5 or 20 shillings. Single copies, 35 cents each. Entered as second-class matter Oct. 14, 1936, at the Post Office at Albary, N. Y., under the Act of March 3, 1879. Printed in the U.S.A. Cable address: "McGrawhill, N. Y." Member A.B.P. Member A.B.C.

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HULBURT QUALITY

COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, Editor

November, 1937

Gloom, Preferred

DELAY in fixing minimum prices under the bituminous coal-control act naturally has been disappointing, but it hardly justifies either the gloomy forebodings or the acid criticisms it has provoked. The problem to be solved is complex. Relationships established by commission action cannot be changed as readily as when each operator is a law unto himself. It is not surprising, therefore, that ready agreement has been blocked by internal disagreements because many of the embattled producers honestly believe their very business existence is bound up in a particular classification or price relationship. An equitable determination in such cases is not a matter for curbstone decision; time and patient consideration are requisite.

"Et tu, Brute"

THAT modern steam-generating plants can produce power more cheaply than the average unsubsidized hydro-electric station is well recognized by non-partisan engineers. Further confirmation is found in the Third Steam Station Cost Survey recently published by Electrical World. This survey, covering twenty-one stations ranging in size from 15,-000 to 300,000 kw., shows operating costs of 1.81 to 3.67 mills per kilowatt-hour for coalburning plants and total costs, including fixed charges, of 4.84 to 10.01 mills. The top figures--15.6 and 20.27 mills-were for a gas-oil plant operated solely as a standby for hydro generation; the lowest operating cost— 1.65 mills—was for a coke-burning station and the lowest total cost-4.14 mills-was for a plant using gas.

But the unkindest cut of all at the Washington administration's hydro-electric program with T.V.A. and its little unborn sisters comes not from the outside but from the bosom of the family. The National Resources Committee is the offender. That federal planning agency, headed by Secretary H. L. Ickes, in its report on "Technological Trends and National Policy," boldly proclaims that "the high efficiency and low fixed charges now possible in large fuel-burning plants place hydro-electric developments at a disadvantage in most sections of the United States if low cost is the objective."

Dedust the Mine

No manager of a gassy mine rests content with protection against methane; he provides also for its removal. So no manager of a dusty mine is safe who merely rock-dusts; he should also rid the mine of fine coal dust. Such was the argument of Subinspector F. E. Stone, of the British Wharncliffe Woodmore explosion inquiry, declaring that where conveyors are used and where travel does not suffice to mix the coal dust with the rock dust, an explosion might raise the one without the other.

At the Wharncliffe Woodmore screens, 74 per cent of the coal dust would pass a 200-mesh I.M.M. screen, and the dust would begin to fly when the air current reached a speed of 1,500 ft. per minute. The mine dust may have been even finer, and it lay on top of the rock dust ready to rise when the air current was speedy enough to raise it. That velocity figure depends not so much on the specific gravity of the dust as on the speed of the air current

which deposited it. As a high-speed ventilating current would deposit only large dust, the velocity of the air that would raise it also might have to be high.

Probably, with dry dust, it is rarely much higher than the ventilation velocity, whereas rock dust may delay its rising until the air speed is 3,300 to 5,000 ft. per minute. In a violent explosion the velocity may be so great that this is of no moment, but some explosions are mere flame propagations that lick up the coal dust and leave the heavier inert dust on the floor, while carbon monoxide and burns pad the death roll. Instead of trapping or wetting the coal dust, roads may be shoveled at intervals to mix coal dust and inert dust and imprison the former.

Sound Doctrine

OPERATORS who favor an industry financially and socially sound can subscribe unhesitatingly to the broad future objectives suggested by Chairman Hosford of the National Bituminous Coal Commission at the National Coal Association convention last month. These call for proper conservation of a great national resource, economic and profitable production and distribution, a square deal to labor and consumer, research into coal values and utilization, and the preservation of fair competition. Mr. Hosford undoubtedly would be the first to disclaim novelty for this program; what he did was to epitomize fundamentals many times before restated.

Such reiteration is very necessary because the attainment of the objectives themselves is obviously so desirable that persistent repetition is essential to overcome the inertia of abstract acceptance. Individual producers and distributors usually are so concerned with pressing problems in their immediate province that they spend little energy in promoting a program against which there is no open or valid opposition. And yet there is no abiding security in the solution of these individual problems if the industry as a whole operates upon bases which are fundamentally unsound. No single operator can hope to dissociate himself from his industry or its common ills.

Mr. Hosford's recommendations for the future policy of the organization he was ad-

dressing, however, must be received with more restraint. The vision of a voluntary association speaking as one voice on questions upon which the industry it represents is still sharply divided is an inspiring one, but fulfillment hardly can come quickly. Reconciliation of conflicting views is an educational process which takes time. Too great eagerness to force unanimity might defeat itself and breed disruption. Past history shows this danger is far from fanciful. Making haste slowly is the quickest road to the association goal Mr. Hosford would set up.

To the Top

RESEARCH to hold existing markets and to find new uses for coal long has been advocated by the scientists, the engineer and the dreamer who refuses to believe that today's mold necessarily must be the pattern for tomorrow. Too often, however, hard-headed operators have looked upon such proposals with scornful indifference or scoffing indulgence. Witness the half-hearted financial support producers have given Bituminous Coal Research, Inc., which was able to enlist only twenty-eight operating companies as stockholders in its venture!

Fortunately, the good work done by this and other agencies is winning increasing recognition from both the indifferent and the skeptical. This was well demonstrated at the 1937 National Coal Association convention when speaker after speaker assigned to other topics digressed to emphasize the importance of research on the future of the coal industry. And the association itself urged the federal coal commission to develop a comprehensive research program to enlarge the trade frontiers of the mines.

These indices of rising interest are indeed gratifying and constitute a richly deserved tribute to the men who have been laboring so long and so hard to create such acceptance. But more than verbal enthusiasm is needed. Compared with other countries and with competing industries in this country, bituminous coal is still a miserable laggard in its financial support of research activities. It takes money to buy even test tubes—and research necessities are much less elemental than that old laboratory symbol.

MOBILE LOADERS

+ Plus Changed Mining Methods at Nellis Overcome Face-Preparation Problems

OW COAL, nearly 2 ft. of drawslate, a parting of hard bone, and local grades some of which exceed 14 per cent constitute a combination which a few years ago ruled out mechanical loading in the minds of all except those who were then termed visionaries. Nellis mine, a 11,000-acre property of the Nellis Coal Corporation in Boone County, West Virginia, has approximately that combination of conditions, yet since September, 1936, it has been operated 100 per cent mechanical. A production average of 120 tons per loader per shift was the projected goal, but one loader has averaged 123 tons of coal since its

installation in April, 1935, and has in addition loaded a large quantity of slate. Face preparation, the principal problem, has been whipped in a large measure by changing mining layout and adopting new cutting practices.

Seven loading machines constitute the equipment, except that recently a two-room conveyor unit was added to work sections too low for the mobile loaders. Production of the mine is 2,400 tons per day of two preparation-plant shifts and two underground shifts. Cutting was changed from the top kerfing of hand-loading days to undercutting, and now in addition to the undercut

a vertical shear cut is proving its economic advantage.

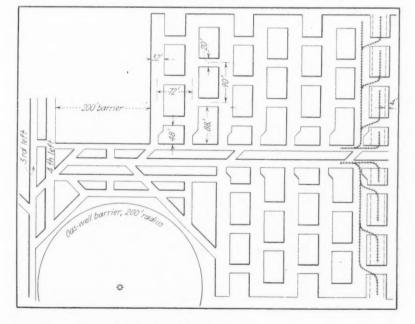
The preparation plant includes a washer (built in 1928 and improved in 1937) in which the 4½x5/16-in. is cleaned in a Koppers-Rheolaveur sealed-discharge launder and the 5/16x0 in a Battelle launder. Approximately 65 per cent of the mine output is captive to the parent concern, the American Rolling Mill Co., and the remainder goes to commercial markets consisting of domestic, railway and industrial consumers.

Average Thickness 54 In.

Fifty-four inches is the average thickness of the coal (No. 2 gas seam) including a 23-in, hard bone parting 10 to 12 in, from the top. Immediately overlying the coal is an 18- to 20-in. stratum of drawslate, of which an average of 71 in. comes down in room work and all of which is taken down in headings. drawslate consists of a variable series or nesting of lenticular formations or slips and only those long enough to span the mined width show a disposition to stay temporarily in place. The coal breaks free from the roof and from both sides of the parting, but is burned to the hard fireclay floor. Only a small quantity of water is encountered in the mine.

Soft gas coal constitutes the 10 to 12 in. above the parting, and, in contrast to that, the lower 12 to 20 in. of the seam is a coal of hard nature difficult to cut as compared to the top-cutting practice followed when the coal was hand loaded. Generally speaking the whole 40 in. of coal below the parting is of a splinty nature. The seam lies on a general gradient of 2 per cent and of the many local dips some are too.

Fig. 1—Layout of a loading-machine section, which in this case happens to be adjacent to a gas well. At the right are indicated the tracks serving rooms, breakthroughs and pillar splits.



severe for successful operation of track-mounted loading machines.

Equipment consists of five Joy 8BU loaders, one Jeffrey 44E and one Whaley No. 3 Automat. Under the Nellis conditions the working heights required for practical operation of these machines are 40 in. from floor to roof, 48 in. from top of rail to roof, and 50 in. from top of rail to roof, respectively. Dates of installation were: Jeffrey, August, 1935; Whaley, February, 1936; one Joy, May, 1936; two Joys, August, 1936, and the last two Joys, September, 1936. Average production per shift for all machines fluctuates between 110 and 120 tons. Room work produces 120 tons and development 100 tons, and in the latter work the machines not only load the coal but also the 25-in. average thickness of drawslate for the full width of the 16-ft. heading. Very little of the slate comes down with the coal in

this narrow work and so it must be drilled and shot after the coal has been loaded.

Frail roof normally points to top cutting as the best method and that was the practice for many years with hand loading. Because the coal is burned to the bottom, however, it was determined that undercutting would result in a face preparation better suited to mechanical loading. A smooth bottom is thus made with scrapping and the proper shooting of the remaining part of the 12 to 20-in. stratum of hard coal at the bottom is simplified. That the disadvantage of explosive shock to the tender roof has proved of little or no consequence is shown by the fact that, due to the speedier mining with loading machines, 7 to 8 in, of drawslate is now handled in rooms, compared to 12 in. with hand loading. Of this 7 to 8 in., fully 95 per cent is removed by the slate men at the face and gobbed along the room ribs.

Shortwall machines with 7-ft. bars making 6-in. kerf were installed for the initial change to undercutting and these are now used in all but one section, where a new Sullivan 7AU track-mounted machine has thoroughly demonstrated its advantages of greater speed and ability to make shear cuts. This latter machine makes a kerf 5 in. wide and 9 ft. deep. The machine and its crew have supplanted two of the shortwall machines and their crews and serves two loading machines, as compared to the shortwalls serving one loader each. Advantages of the shearing include: (1) reduced maintenance of the loading machines; (2) increased lump, which is of advantage during the season of domestic demand; (3) increased loading speed of loading machines, and (4) reduced shooting cost by reason of fewer holes to be drilled and less explosive used.

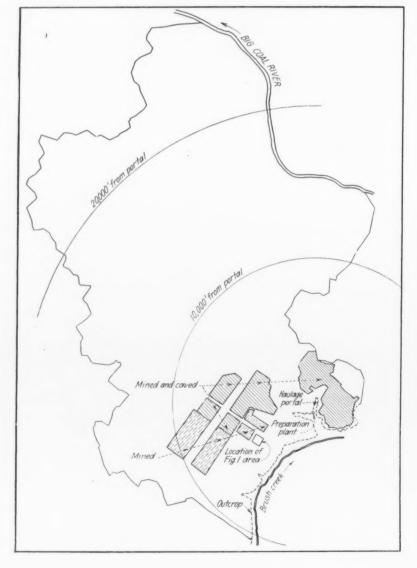
Pillars are mined immediately after completion of the rooms and this recovery consists of driving a room or split 32 ft. wide through the length of the 40-ft. room pillars, thus abandoning 4-ft. wing stumps on each side. Rooms are driven 32 ft. wide and 300 ft. deep on 72-ft. centers. The track is placed in the center of the room and, as mentioned earlier, the refuse is gobbed along both sides. As an average only about 5 per cent of the room refuse is loaded into slate cars.

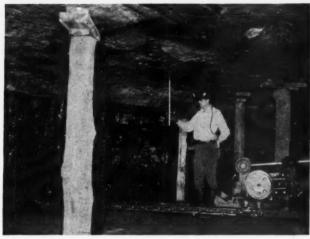
Breakthrough 20 Ft. Wide

Breakthroughs 20 ft, wide are driven through room pillars on 90ft. centers. In one room the first breakthrough is 58 ft. from the center of the heading and in the adjacent room it is 98 ft. (Fig. 1). Track switches are left in the breakthroughs to be used in splitting pillars and these switches accommodate four cars each, thus providing short runs for most of the car changes. One standard-speed 6-ton cable-reel locomotive serves each loading machine. Mine cars which were loaded to 2.4 tons hand loading average 2.1 tons machine loaded. The car equipment consists of three types but the capacities are approximately

Face preparation and loading during the two shifts is a continuous operation and none except maintenance men work in the mine during the third shift. Eleven men comprise a normal Joy crew and these are classified as follows: one loader operator; one loader helper; one cutting-machine operator and one helper, who do drilling as well as cutting; two slate men; one shot

Fig. 2—To date only a small percentage of the 11,000-acre Nellis property has been mined





In this No. 6 room, on Third North, where the mounted cutter is about to sump in, the general engineer measures as 20 in. the drawslate taken down with the previous cut. Here the bed is 58 in. thick and lies on a 4-deg. rise.



After the shot which followed the undercut and shear cut of which the start is shown in picture at left; large chunks marked X are drawslate which fell with the shot. A 2-in. crack indicates a large body of slate is about to fall

fireman who dusts the cut, loads, tamps and shoots; one motorman; one brakeman; one trackman and one timberman. The slate men and the timbermen interchange jobs.

Two loading-machine helpers are employed in a Jeffrey loading-machine crew and these two men, along with their clean-up duties, pick out about 10 per cent of the bone parting. With the Whaley machine, which is used principally on entry work, where slate loading is a considerable part of the task, only ten men are required because the timbering there is a small item compared to that in room work.

Drilling is done with Jeffrey permissible electric equipment and the explosive is DuPont Lump Coal "C." With the 7AU cutter a shear cut is made 8 ft. from the right-hand rib and the shooting is done with two bottom holes spaced 4 to 5 ft. each side of the shear, two top rib holes and a third top hole on the

wide side. Following the shooting, which as a rule causes some slate to fall with the coal, the slate men pry down all possible of the unstable remainder, then clean all that can be reached from atop the coal, and pile this refuse back in the clear along the ribs.

Shift hours are 6:30 a.m. to 3 p.m. and 4 p.m. to 11:30 p.m. and a total of 225 men work underground on those two shifts. Three-shift operation was tried for the first ten months. A present objective is to produce as much coal per loader on two shifts as was produced in three shifts. Two-shift operation, Nellis management believes, affords a better chance to maintain equipment properly, and this maintenance is now keyed to utilize the third shift in making all inspections, lubrications and repairs so as to carry the equipment through two shifts without delays. Time studies were made after the work was well established

and the avoidable delays thereby spotted have been corrected.

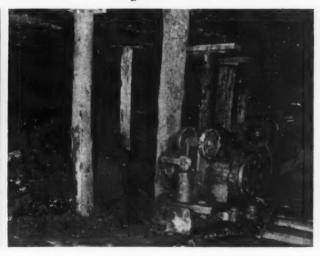
Coal height as well as drawslate and gradients vary widely over the mine, therefore sections have been encountered which afford insufficient clearance to operate the loaders. The conveyor equipment recently installed to get the low coal is a Joy chain-flight type and consists of two 300-ft. room conveyors, two 25-ft. face conveyors and one 100-ft. gathering conveyor.

Charles W. Connor, superintendent of mines, including the Nellis property, has on his staff the following men who are directly concerned with underground operations: Wayne Davis, mine superintendent; Paul R. Maxey, general mine foreman; Alva Oakley, assistant general mine foreman; H. D. Parnell, chief engineer; Charles W. Connor, Jr., general engineer, and T. W. Blake, chief electrician and master mechanic.

Prior to entry of the loading machine slate men must take down the loose slate and gob it back in the clear along the room ribs



This view, from the face of a room back over the cutter bar of the mounted machine, shows drawslate gobbed along the rib at left



November, 1937 - COAL AGE

MODERN ARCHITECTURE

+ Enters the Field

Of Preparation-Plant Design

HE equipment installed in recently constructed coal-preparation plants has traveled a long way in modernization. The next step, and an inevitable one, must be to modernize the structure which houses this equipment. In this one move it will be possible to improve the over-all efficiency of the plant; reduce maintenance cost; make the plant a better place to work in; promote better public relations; sell more coal and add protection to the investment. There can be no doubt that the value of these gains collectively will repay the additional cost many times over.

For years tipples, washeries and rescreening plants have been built along more or less standardized structural lines. Floors and framework were arranged first to accommodate the machinery and second to give working space for the operating crew-in many cases without any great concern for appearance or other desirable features and functions in the plant. Sash were scattered throughout the sidewalls for expedient ventilation and lighting; in later years, for good measure, skylights were introduced in the roof over picking tables and other working areas. As billions of tons of coal has been produced and marketed from such plants, the natural question rises, "Why change?"

The logical answer to this may be found in the thinking and practices of more than one industry. It is reported that when the Chrysler Corporation began plans for its new Dodge truck plant, now under construction, Walter P. Chrysler issued the terse order: "Build it modern, inside and out!" Emphasis on the modern note in plant construction is nothing new to leaders in the automotive industry. It's part of their production and merchandising re-

ligion. They have firm belief in its power to make better cars, to sell more cars, and to build greater profits.

The building in which the preparation machinery is housed is as much a piece of production equipment as the shaker screen or the jig for washing coal. From the standpoint of sales value, light, ventilation, safety, convenience of workers, reduced upkeep, ready access to equipment for maintenance and repairs and other factors of production, the design of structure is manifoldly important.

In Europe, where the nearer approach of coal exhaustion has commanded conservation, the resulting slower depletion rate justifies greater permanency of mine structures and bigger investments therein. Under the conditions in this country, the increased cost of the massive brick, concrete and steel buildings exemplified by European construction cannot be justified except, perhaps, in the most extreme cases. Our problem then is how to secure the advantages of better design at a cost that our economy will bear.

New materials, new methods of construction and new ideas of design offer the solution. To the operator who wants to make the barest minimum expenditure it is not yet possible to sell a building designed for the greatest advantage to him, any more than it is possible to sell a high-class piece of machinery for the price of a unit of moderate serviceability. But to those who are willing to make a relatively small additional expenditure, it is possible to give much of the improved efficiency, durability and appearance in modern structural design.

What should modern structural design give the purchaser in the way of increased facilities? We would

By W. F. BARNES

Manager, Coal Preparation Division Jeffrey Manufacturing Co. Columbus, Ohio

list the advantages as follows:

1. Light

- 2. Ventilation and insulation
- 3. Convenient access
- 4. Fire safety
- 5. Durability
- 6. Appearance and advertising value

7. Organization effect.

Man is a creature of the daytime, and as a general rule he does not work well or efficiently in the dark. Even though the preparation plant of today is highly mechanized, there will be from 10 to 30 men employed in its confines. If the larger sizes are to be hand-picked, adequate illumination must be provided over the picking tables for the easy classification of coal and reject material. At all points in the tipple, floors, walkways and equipment should be adequately lighted for the convenience and safety of the crew. The safety engineer will strongly urge adequate lighting on walks and stairways, well knowing the toll of accidents and compensation payments annually rolled up by bad lighting at these points.

The modern structure obtains natural lighting in three ways:

- (1) By use of continuous runs of large-paned sash in the side wall to form at least 25 to 30 per cent of the area;
- (2) By use of special glass which will better diffuse and project light through the side walls into the interior of the structure:
- (3) By adequate use of roof light which, coming strongly down through skylights, gives high natural illumination per square foot of glass area.

Standards of adequacy have been set up for illumination for all classes of industrial structures. By calculations and graphs the amount of illumination at any point within a plant may be closely determined in advance and subsequently checked through a selenium cell.

Coal-preparation processes raise varying quantities of dust within the plant. Without large expenditures for equipment inclosures and suction fans, it is impossible to eliminate the evils of this condition entirely. But modern design mitigates the dust nuisance inside the plant by assuring adequate ventilation with cross currents of air or upward drafts to carry away dust and heat. Roof decks of wood, mineral slabs or other insulating material reduce the temperature inside the structure and afford comfort to the workers. Similar side-

cal equipment and working spaces can be secured only by planning and the expenditure of a little money to provide adequate walkways and clearance at all important points. A trip through modern existing plants will make one fully appreciate this convenience. In earlier construction, board catwalks, head-bumping clearances and dangerous working restrictions around drives were all too much in evidence. The small amount saved by such construction will be paid out many times in high maintenance cost and expensive accident reckonings.

For easy passage a 30-in, walk is about the minimum that should be used. At picking tables men should be spaced no less than 4 ft, apart if refuse chutes are to be placed

may be employed without greatly increasing the fire hazard, as the fact is well known that a fire is not easily started on flat areas without projecting, easily ignited corners.

The design and construction of such floors and roofs play a large part in safety from fire. Modern design is approached by accounting in terms of first cost, depreciation, maintenance and insurance, to determine the construction economically suited to the particular case. The purchaser should remember that a mine whose preparation plant is destroyed by fire immediately becomes a non-producer, and that rarely will any form of insurance cover all the damage sustained during the ensuing idle period.

Coal-preparation plants are



Fig. 1—The already erected Hickory Grove plant represents a big step toward modern design. Its form and dressed-up appearance, achieved by liberalization of utilitarian aspects, departs from the nondescript. This is perhaps the first American plant completed from architecturally projected plans in the new mode.

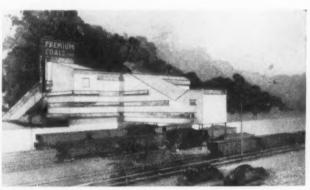


Fig. 2—An example of median approach to modern architectural form in a design to improve appearance as well as serviceability. The large sign, atop the high roof line and readily visible from any near-by road, adds tone contrast besides affording an opportunity to sell the company name and product.

wall construction is of great advantage if a little extra money can be expended on this part of the construction.

The roofs, however, are responsible for the greatest amount of heat penetration and should be the first consideration. Ordinary construction, with corrugated iron roof and low clearance above the workers' heads, turns the plant on a hot day into a good imitation of a bake oven, it being not unusual to find the temperature under its roof 15 to 20 deg. higher than the outside temperature.

To assist in the elimination of dust from the working spaces, it is wise to include in the structure dustproof partitions (made by laying tar-paper gaskets in the joints of corrugated iron) around shaker screens and similar dust sources. These spaces should be ventilated by fresh-air inlets at floor level and ventilating equipment at the highest point so as to get the chimney action required to carry off the dust.

Convenient access to the mechani-

conveniently between them. At drives and points of maintenance, 3 ft. is none too much space for men to handle pieces of machinery. Walks, stairs and platforms, of course, should be adequately guarded with rails and toe boards, and paved with non-skidding surfaces which will not allow accidents when a little grease or oil is spilled. Modern structure will provide these features.

Fire-safe construction is guaranteed by the employment of non-burning materials and should be strongly featured. The structural frame and side walls should definitely be of fireproof material, such as steel, concrete or mineral slab. Steel grating or concrete floors and concrete or mineral-slab roofs are ideal from the standpoint of fire safety but are expensive in first cost. A 2-in. oak floor offers little chance for a fire and in most cases will not affect the insurance rate on the structure if the floor is laid with tight joints and supported by steel members. Similarly constructed, a wood roof deck

built to serve through a period of many years-and the cost per ton of coal produced may be seriously increased by the maintenance and repairs on a flimsy plant of cheap materials. A modernly designed plant, without excessive extra investment, should require a minimum of maintenance. Corrosion- and wear-resisting materials for side walls, roofs and floors protect these three vulnerable points. Rigid framework, adequately braced, assures the continued solidity of the complete plant, eliminating excessive vibration and sway that not only rack the plant structure but throw the producing units out of alignment.

The advertising value of a modernly designed preparation plant is far greater than is generally appreciated. Nothing so well impresses the purchasing agent of a consumer, or a dealer whose account is being sought, as a trip to the mine. He will be interested, of course, in the production methods underground, but to him the prize of all will be the

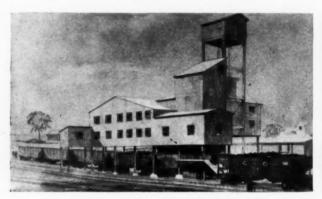
preparation plant, for on this plant depend the quality or salability of the coal by which he makes his living. Though a plant may have the finest of preparation equipment, providing for thorough screening, rescreening, washing and drying of coal, to the prospective purchaser the appeal is greatly enhanced when the equipment is set in an attractive, well-kept structure.

If he is a progressive dealer, he has already learned the value of a trim-kept yard, well-maintained machinery and a clean, well-appointed office in dealing with his customers. He naturally appreciates these same features in the plant of the producer. In today's competition for coal orders, with appearance and quality being given increasing con-

Grove Coal Co., at Jasonville, Ind., in which lines and form have been determined primarily by functional objective, yet in which utilitarian aspects have been moderately liberalized to dress up the appearance of the In this plant, columns, structure. girders and floor structure over the tracks are all of reinforced concrete, the columns being flared to give a graceful effect to these members as well as to add rigidity to the structure. The housing above and also the washery section to the right are steel-frame design, with the heavier loads carried direct to the foundations by stout, heavy members, adequately braced.

Continuous sash in the side walls and a continuous monitor at the top of the building provide plentiful light over the washing, shaker-screen and rescreening bays assure adequate lighting in every part of the plant. Adjustable sections of sash provide cross ventilation on all operating floors. The structure would be completely fireproof with steel frame, steel side walls and steel or precast-slab roof decks. An opportunity is presented to advertise the plant, and to add a touch by striking color contrast with the structure, by installing a large sign atop the highest roof line, where it would be readily visible from an adjacent highway.

To illustrate what may be accomplished in the ultra-modernization of preparation-plant design by utilizing modern materials and ideas, two contrasting studies of the same basic layout are presented in Figs. 3 and 4.





Figs. 3 and 4—Contrasting the old with the ultra-new, here are two renditions of the same basic layout. In the ultra-modern example the headframe is sheathed as part of the plant proper. This plant incorporates not only new design but also new construction ideas and new materials. It is both engineered and architecturally projected.

sideration, proper plant setting and display are a bigger influence than they were in earlier times, when coal was coal and price more often clinched the sale. A plant modern in appearance as well as in performance is a card in the hole for the coal sales organization.

The effect on a producing organization of a well-designed, lighted, ventilated and attractive appearing plant is self-evident. Men take pride in maintaining such a plant. It is a natural incentive to better plant-keeping and brings attendant savings in the cost of production, maintenance and accident prevention. An employee likes to be proud of the plant he works in. A moderate expenditure to foster this pride of organization is a sound investment for the producer.

Three variations of design, each representing a different degree in the modern motif, are exhibited in the accompanying sketches. Differentiating them in the ascending order of their departure from nondescript form, Fig. 1 shows a new washery already erected for the Hickory

and ventilation to all parts of the plant. The side walls and roof are of corrugated iron for low-cast construction, but in the design roof lines have been kept well above floor level, which, with continuous ventilators, will assure a cool building. This is an excellent example of an attractive design with low-cost, completely fireproof construction and with functional advantages giving greater convenience to operation and maintenance of the plant, as well as added comfort to the crew. Exposed steel members around sash panels and at bottom of side walls, painted a contrasting color, trim and set off the side-wall panel.

Still greater attention to modern architectural form for the sake of appearance and other advantages, without any great addition in cost over a structure having strictly utilitarian lines and form, is indicated in Fig. 2. Incidentally, this projection is well adapted to conditions where a side hill causes a difference in level between the track and washing plant. Continuous sash panels in the side walls with inclined skylights

Fig. 3 shows a tipple with standard corrugated roof and side walls, intermittent sash areas, and roof lines sloping in all directions in strict conformance with the machinery layout, without any great concern for appearance. Fig. 4 illustrates the same basic layout improved by modern materials and stylized for the maximum in modern motif. Flat roof decks of prefabricated slab construction insulate the interior from heat and cold and side-wall construction of the same material adds to this protection. Continuous sash provide ventilation and light for the structure; steelframe construction with concrete and steel grating floors assures protection from fire with minimum maintenance and depreciation; dust partitions within the plant isolate the dusty shaking-screen bay from the picking floor.

The stark contrast between these two renditions of the same plant—the one engineered only, and the other both engineered and architecturally projected—demonstrates the wide realm of possibilities in modern ideas, materials and design.

LEGISLATIVE COURSE

+ Charted at Twentieth Annual Meeting Of National Coal Association

HE relations of the bituminous industry to the public, either directly as potential or actual consumers of its products or indirectly through the federal government as the source of legislative measures regulating the industry, were the theme of the annual meeting of the National Coal Association, held Oct. 7 and 8, at the William Penn Hotel, Pittsburgh, Pa. This meeting marked the completion of twenty years of service to the in-

dustry by the association.

With the Bituminous Coal Act of 1937 on the books and measures for its application well under way, members of the industry spent little time in backward looks at the underlying causes of regulation but focused their attention on ways and means of securing the maximum benefits from the act, the best methods of accomplishing revisions which may be necessary as experience is gained, and consideration of the possible course of events after 1941, when the act expires. Developments on the legislative fronts, including wagesand-hours measures, hydro-power promotion, taxing and regulating other fuels, stream pollution, railroad restrictions and tax measures, were analyzed and future prospects charted.

Neither did members of the industry sigh over past sins of omission or commission in the fields of market promotion or increased coal utilization. Instead, a major feature of the deliberations at Pittsburgh was consideration of methods for protecting and expanding present markets for solid fuels and for creating new outlets. With a backlog of tangible achievements growing out of work already done, producers displayed a marked interest in the possibilities of

cooperation with allied equipment industries in a national promotional program and in expanding research activities. The wholehearted acceptance of the principle of research as a marketing tool was one of the highlights of the meeting. The market-promotion and research phases of the meeting are covered in the report beginning on p. 67.

Resolutions adopted in the course of the meeting carried out the two major themes. The committee on public and government relations was



A Program for Coal

1. Coal, as a great national resource, must be preserved under a plan evolved by the coal industry but enforced by the government.

2. The production and distribu-

tion of coal must be placed permanently on a sound economic basis.

basis.

3. The rights of labor in the industry must be recognized and protected to the end that the coal miner shall have working conditions and wage levels which conform to American standards.

 The services rendered by the distributor of coal must be recognized and justly compensated.

5. The consumer always must be assured adequate and dependable supplies of coal at reasonable prices

6. The coal industry must enlist the aid of science to arrive at a better determination of coal values and to secure a more complete utilization of coal.

7. The coal industry owes to itself and to the people of our nation an obligation to maintain a state of fair competition.—Charles F. Hosford, Jr., chairman, National Bituminous Coal Commission, at National Coal Association convention.

directed to give continuing study to the workings of the Bituminous Coal Act as a means of arriving at conclusions on its operation and suggestions for amendments, and also was directed to investigate proposals for decreasing working hours in the coal and other industries as a preliminary to the development of a policy based on efficiency, economy and fairness to employers and employees. Opposition to government competition in the generation and sale of hydro power and to the principle of government ownership of the railroads was reaffirmed. Further restrictions on railroad operation, such as the proposal for limiting trains to 70 cars, was condemned and the conviction that the future welfare and earning power of the carriers would best be served by lowering freight rates was again spread upon the record. Appointment of a special committee charged with the responsibility of considering federal tax questions as a prerequisite to the establishment of industry policies was approved.

The market-promotion campaign initiated by the association during the past year also was approved and its continuance and expansion authorized. In addition, the National Bituminous Coal Commission was urged to develop as soon as possible a research program looking to the increased use of coal, and the cooperation of the association to that

end was pledged.

Heath S. Clark, president, Rochester & Pittsburgh Coal Co., Indiana, Pa, was chosen as the association's new head, succeeding J. P. Williams, Jr., president, Koppers Coal Co., Pittsburgh, Pa., who took over the helm in October, 1934, and declined reelection. Vice-presidents



Heath S. Clark
Newly elected president, National Coal Association

were elected as follows: W. L. Robison, president, Youghiogheny & Ohio Coal Co., Cleveland, Ohio; C. C. Dickinson, president, Dickinson Fuel Co., Charleston, W. Va.; and Douglas Millard, manager of sales, fuel and byproducts division, Colorado Fuel & Iron Corporation, Denver, Colo. Col. W. D. Ord, president, Empire Coal & Coke Co., Alexandria, Va., one of the original members of the association and treasurer since 1929, was unanimously reelected, as was J. D. Battle, executive secretary, Washington, D. C. Messrs. Clark, George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co., Chicago; and C. E. Bockus, president, Clinchfield Coal Corporation, New York, presided over the three sessions into which the meeting was divided, with Fred S. McConnell, vice-president, Enos Coal Mining Co., Cleveland, Ohio, and chairman of the annual meeting committee, officiating at the annual dinner, at which I. B. Hill, president, Louisville & Nashville R.R., was toastmaster.

"Why is it so difficult to reach a stable price basis in the bituminous coal industry?" asked Mr. Williams in referring to the work of the district boards under the Bituminous Coal Act in his opening address. "To my mind, it is due to the great number of units, or companies, in the industry, most of which have their entire investment in one field and are restricted in their markets by competition from other fields and by a hodgepodge of freight rates.' The easiest answer is mergers into large companies with operations in each of the major fields so that they can reach all markets. "Five or six such companies controlling 250,000,-000 to 300,000,000 tons of production could soon bring a large measure of stabilization," and their management would have a national, rather than sectional, viewpoint.

Mergers, however, are much more easily envisioned than accomplished. "What we all want to know is where we are going under the present Bituminous Coal Act. My answer is that we must adopt a cut-and-try policy." Initial price schedules will

contain inequities which can be corrected when found and there will be shifts, as happened under free competition also, in tonnages between districts. "If we can obtain relatively the same amount of business and make that business profitable, we will have taken a long step forward. The Bituminous Coal Act of 1937 expires in 1941. What we will have then depends in large measure on what the industry does for itself between now and that time. If we have attained a large measure of stability, government regulation may be lifted. If we are still in confusion and at each other's throat, we may get much more stringent regulation.

"I believe that regional marketing agencies offer the best road to stabilization by the industry itself at this time. They are provided for under the act, subject to the approval of the Commission. They provide a flexibility that we cannot get under the act in that they can set prices between the minimum and maximum set up by the Commission. Due to the minimum prices set by the Commission, they are in much stronger position to deal with non-members. They also are in much stronger position with respect to inter-district competition. They still have all the advantages of group advertising and market promotion. They provide an open book on past transactions of your competitors and disseminate accurate information instead of gossip. . . The bituminous industry is paying approximately \$4,500,000 per annum to the federal government and about \$2,000,000 more to district boards to bring stabilization to our industry. Certainly we should be able to do that job at substantially less cost."

Fixing of Hours Opposed

It is too soon to determine the effect of the Bituminous Coal Act, declared Mr. Battle, in presenting the report of his stewardship for the association. Changes undoubtedly will be made, but "long before April, 1941, we should know whether or not the coal industry is to be permanently regulated by the federal government." On other fronts, the original Black-Connery 30-hourweek bill eventually was sidetracked. to be replaced in the last session of Congress by the so-called fair labor standards bill, seemingly so drawn as to affect the bituminous industry but little with its short hours and relatively high wages. Despite this, however, coal opposition was warranted on the basis that there is no telling how far the theory of fixation of hours and wages by a federal

board will go once the principle is established.

There has been no let-up in the opposition to T.V.A. and other government hydro-power projects, said Mr. Battle, who pointed out that in this connection "the right of the federal government to conduct a full-fledged hydro-electric power business has not yet been settled by the Supreme Court. So there is hope in that direction, as well as hope, and some indications to justify the hope, that Congress and the country are belatedly coming to see the dangers in the program and that opposition to it in Congress is on the increase." The administration, however, has served notice that proposals for creating regional conservation and power authorities to blanket the country "are to be vigorously pushed in the next session of Congress."

Hope for Stable Gas Prices

While the tax on imported fuel oil has been maintained at 1/2c. per gallon, attempts to increase this levy have so far failed. Also pending in Congress are measures to impose a tax of lc. per gallon on the sale of all fuel oil except for internal-combustion engines. Efforts to enact legislation to control the natural-gas industry came near to fruition in the last session of Congress, and a regulatory measure, even though with certain objectionable features, now is pending before the Senate and offers the possibility, if enacted, of stabilizing to some degree prices for natural gas entering interstate commerce.

Stream-pollution measures pursued a checkered course in the last Congress, and legislation-possibly with highly objectionable provisions-will be a subject at the next session. Additional proposals which will be taken up in the coming session are amendments to the Social-Security Act and a general revision of the Revenue Act, including not only broad questions of the rates on income and undivided profits but also the special questions of the excise tax on imported and, perhaps, domestic fuel oil and the percentage depletion allowance. The Treasury Department has listed the latter as one of the tax-avoidance "loopholes" and has recommended its repeal, although its retention is favored generally by the mining industry. Action was deferred by Congress, but the issue will have to be met this coming winter.

Concurring in Mr. Battle's analysis of the regulatory and legislative pictures, Charles O'Neill, president, United Eastern Coal Sales Corporation, New York, and chairman of the government and public relations committee, termed the Guffey-Vinson act the most important of all matters now concerning the industry. The law, said Mr. O'Neill, is now on the statute books. "It deserves respect and support. The way to determine whether it will prove helpful to the coal industry is to give it a fair and impartial trial, cooperate in every way possible, point out its shortcomings in a constructive way and look forward to such changes and amendments as may be advisable in the interest of the industry and the general public."

The last five years has been characterized by many events vitally affecting future trends in the bituminous coal industry and culminating in the Bituminous Coal Act of 1937, declared Charles F. Hosford, Jr., chairman, National Bituminous Coal Commission. "Only the brief space of five months has intervened since the effective date of the act, but in that space of time you have followed with great interest the organization of the Coal Commission, the promulgation of the Bituminous Coal Code, the setting up of the several district boards under the act and the beginning of the intricate procedure which soon will lead to the establishment of minimum prices by the Commission.

What Will 1941 Bring?

"Today there lies immediately before you the formulative period in which the effectiveness of the present law and the soundness of its policies will be determined. Seemingly far distant and vet not so far as we measure events in a rapidly changing world, looms before members of the coal industry the day in 1941 upon which the present law, by its terms, will cease to be effective. Quite appropriately, the members of the coal industry and particularly those affiliated with the National Coal Association may well ask themselves the question, 'What of the future?' That question should not be answered with the smug complacency and studied indifference which too often in past years have marked the thinking of men in our industry.

"We, as coal men, have been notorious for a lack of self-discipline and self-government and yet we have retained a reasonable measure of public sympathy and support. We have been heedless of the progress of modern invention and yet science awaits only a friendly invitation to join in the solution of our problems. We have been unmindful of the progress of conservation measures and regulatory laws in other coalproducing countries and yet government has offered us its aid. There is no more difficult task than that of explaining to the casual observer why a nation-wide industry entrusted with the utilization of our most valuable natural resource has failed to accept its economic and social responsibilities, with the result that government has been compelled to direct its aid to the industry by legislative mandate.

"I do not hestitate to reaffirm my unwavering belief in the principle of industry self-government. I do not believe that it is the function of government to intervene in private business except when and where the public interest inescapably requires such action, but from the record where can be found a more clear-cut case of inability to govern itself than we find in the coal industry? And the inevitable consequence has been the enactment of a regulatory law.' While coal men have learned much in the past five years, "their utter inability to agree when confronted last January with the prospect of immediate enactment of a regulatory law disclosed a weakness which can be cured only by further education.

Cooperation—or Else?

"Not long ago I said to members of the State Bar Association of West Virginia that the bituminous coal industry was now being put to a crucial test; that if the Act of 1937 failed because of lack of cooperation or because of sabotage from industry members, or was repealed because of admitted impracticability or unsoundness in principle, then the industry could not witness a return to the days of 'free competition.' Rather, we are bound to have a more complex and more rigid regulation than is contemplated in the present law."

The National Coal Association, contended Mr. Hosford, must determine whether it will take on additional responsibilities in the light of past developments and thus assure its right to act as the industry spokesman in the future. "In the future, if your association is to become the voice of the industry, you must face unhesitatingly many difficult and unpleasant tasks; you must have the courage and foresight to propose and answer questions on which there necessarily must be widespread differences of opinion. For years you have avoided the subject of labor relations" and "have confined your membership to producers of bituminous coal" regardless of the fact that hundreds of distributors render invaluable service to the industry.

"In recent years, you have contributed little to the general subject

of the development of the natural and human resources of the nation." too frequently basing conclusions on immediate effect on production and consumption; have failed to take any position on the subject of national legislation for the industry; and have neglected to meet the issues involved in coal-rate cases fairly and squarely, thus contributing to one of the causes of excessive freight levels today. "Last but not least, what about the consumer and his use of bituminous coal? For years you have allowed competing industries to invade your markets through the expenditure of millions of dollars for study, experimentation and advertising, and now, after rich markets are lost, after competing fuels have gained an advantage of years of study and experimentation, your association is finally waking up to the need for research and advertising."

Stabilization Pledged

Despite rumors to the contrary, Mr. Hosford concluded, establishment of prices by the National Bituminous Coal Commission is not a matter of months and "there is no stopping" of the Commission's work. "Like it or not, this industry is going to be stabilized. It can and will be stabilized in accordance with this present law and with the cooperation of the intelligent members of this industry. And when these prices go into effect and become an accepted part of our business, when once you have worked under their rule, you will look back and wonder why any of us were ever so foolish as to doubt the possibility of a reasonable and useful and practical regulatory law."

The rôle of marketing agencies in the industry picture today was the subject of an open forum in the course of the N.C.A. meeting. While such agencies at present necessarily are preoccupied with establishing coal prices, said R. E. Howe, president, Appalachian Coals, Inc., Cincinnati, Ohio, once these are settled they have a broad opportunity in the field of promoting consumer acceptance of bituminous coal as a fuel by improving quality, studying utilization and raising the standards of merchandising. Marketing agencies share with the National Bituminous Coal Commission and the district boards the responsibility of putting the provisions of the Bituminous Coal Act in effect, averred Herbert S. Salmon, president, Alabama Coals, Inc., Birmingham. One major function is localizing the necessarily general edicts of the Commission. The opportunities for intensive market promotion open to marketing agencies, as compared with other organizations, were pointed out by William G. Caperton, president, Smokeless Coal Corporation, New York City. He stressed the belief that these agencies offer a medium through which coal people can govern themselves, as well as the best opportunity of getting more than the minimum price prescribed under the Coal Act.

Until recently, said Fred H. Clausen, president, Van Brunt Manufacturing Co., Horicon, Wis., taxes were levied for the primary purpose of "meeting the cost of government economically administered." burden was small and the taxation problem was local. "The second stage in the development of a taxing program was the promotion of government spending on the theory that the use of tax revenues for any altruistic purpose was justified as long as the direct impact of the required tax could be limited to minorities." This brought the federal income tax to supplement original indirect taxes and excises. "Until the emergency created by the World War, the rates of tax were modest, particularly on corporate earnings. The theory was that direct burdens on business should be held at a minimum and the main reliance for revenues should rest on incomes in the hands of individuals." Even the war emergency and the onset of the depression failed to make much change in this principle.

Business Stability Threatened

Then, "like a thunderbolt out of a clear blue sky," a third tax concept was "thrown at unsuspecting business enterprise": i.e., the assumption by the government of control of the earnings of corporate business by "compulsory distribution of earnings through the imposition of severe penalties for their retention for the legitimate purposes of business operations and development." This law "is at once a blow to thrift, stability and the future development of private business," and unless repealed or at least modified in its terms, "the ultimate disastrous results will assume proportions not now understood."

Outstanding defects of this corporate surtax, according to Mr. Clausen, include hardships on corporations with impaired capital, which, in addition to other burdens, are required by law in some States, to refrain from dividends while capital is impaired and thus are penalized either one way or the other; adverse effect on debt-burdened corporations; inadequacy of relief provisions where contractual obligations restrict the ability of corporations to distribute

earnings; the prospect that if earnings are retained to provide increased working capital necessary with an expansion of business activity or to defray the cost of improvements and betterments approximately one-third will be taken by the government; the possibility that future payments of a tax on undistributed earnings will be exacted as a result of deficiency determinations growing out of variation between statutory and true income; and unequal effects on different corporations in different types of businesses. A major-effect of the law is to force business to base its conduct not on accepted principles but on the avoidance of excessive tax burdens and penalties. Business, Mr. Clausen recommended, should press for repeal of the law as a matter of principle and, lacking that, contend for amendments which will recognize established facts.

Directors Chosen

The following directors were elected: O. L. Alexander, president, Pocahontas Fuel Co., Inc., New York City; C. E. Bockus, president, Clinchfield Coal Corporation, New York City; J. G. Bradley, president, Elk River Coal & Lumber Co., Dundon, W. Va.; J. E. Butler, general manager, Stearns Coal & Lumber Co., Stearns, Ky.; William G. Caperton, president, Smokeless Coal Corporation, Charleston, W. Va.; C. T. Carney, vice-president, Scandia Coal Co., Des Moines, Iowa; Heath S. Clark, president, Rochester & Pittsburgh Coal Co., Indiana, Pa.; Ira Clemens, president, Commercial Fuel Co., Pittsburg, Kan.; Henry T. DeBardeleben, president, DeBardeleben Coal Corporation, Birmingham, Ala.; C. C. Dickinson, president, Dickinson Fuel Co., Charleston, W. Va.; George C. Eastwood, president, Va.; George C. Eastwood, president, Consolidated Coal Co., Saginaw, Mich.; William Emery, Jr., presi-dent, Cambridge Collieries Co., Cleveland, Ohio; J. D. Francis, president, Island Creek Coal Co., Huntington, W. Va.; C. W. Gibbs, general manager, Harwick Coal & Coke Co., Pittsburgh, Pa.; George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co., Chicago; Moroni Heiner, president, Utah Fuel Co., Salt Lake City, Utah; Calvin Holmes, president, Holmes-Darst Coal Corporation, Knoxville, Tenn.; D. D. Hull, president, Virginia Iron, Coal & Coke Co., Roanoke, Va.; R. L. Ireland, Jr., vicepresident, Hanna Coal Co., Cleveland, Ohio; W. J. Jenkins, president, Consolidated Coal Co., St. Louis, Mo.; R. H. Knode, president, Stonega Coke & Coal Co., Philapresident,

delphia, Pa.; George H. Love, president, Union Collieries Co., Oakmont, Pa.; J. F. Macklin, president, J. H. Weaver & Co., Philadelphia, Pa.; Crawford C. Madeira, vice-president, Madeira, Hill & Co., Philadelphia, Pa.; E. C. Mahan, president, Southern Coal & Coke Co., Knoxville, Tenn.; Fred S. McConnell, vice-president, Enos Coal Mining Co., Cleveland, Ohio; Douglas Millard, manager of sales, fuel and byproducts division, Colorado Fuel & Iron Corporation, Denver, Colo.; J. D. A. Morrow, president, Pittsburgh Coal Co., Pittsburgh, Pa.; Charles O'Neill,

president, United Eastern Coal Sales Corporation, New York City; W. D. Ord, president, Empire Coal & Coke Co., Landgraff, W. Va.; Charles A. Owen, president, Imperial Coal Corporation, New York City; D. H. Pape, president, Sheridan-Wyoming Coal Co., Monarch, Wyo., C. F. Richardson, president, West Kentucky Coal Co., Sturgis, Ky.; W. L. Robison, president, Youghiogheny & Ohio Coal Co., Cleveland, Ohio; S. A. Scott, president, New River Co., Mt. Hope, W. Va.; W. C. Shank, president, Crowe Coal Co., Kansas City, Mo.; J. Noble Snider, vice-

president, Consolidation Coal Co., New York City; C. F. Spencer, president, Pittsburg & Midway Coal Mining Co., Pittsburg, Kan.; Grant Stauffer, president, Hume-Sinclair Coal Mining Co., Kansas City, Mo.; A. B. Stewart, president, Davis Coal & Coke Co., Baltimore, Md.; Louis Ware, president, United Electric Coal Cos., Chicago; C. W. Watson, president, Elk Horn Coal Corporation, Cincinnati, Ohio; J. P. Williams, Jr., president, Koppers Coal Co., Pittsburgh, Pa.; L. E. Woods, president, Red Jacket Coal Corporation, Huntington, W. Va.

PHILADELPHIA & READING

+ Installs Straight Battery Locomotives For Main and Gathering Service

By R. DAWSON HALL Engineering Editor, Coal Age

IRST in the world to use electric cap lamps in coal mines and active in their early development and first in the United States to introduce oxygen breathing apparatus, the Philadelphia & Reading Coal & Iron Co. pioneered also in the anthracite region in the use of "permissible" (U. S. Bureau of Mines approved) straight storagebattery locomotives and is using them to haul both coal and rock, not only in gathering service but on main-line haulage. Starting with eight of these permissible locomotives, it now has twelve-about half those now in use in scattering mines of the anthracite region; most of the other companies have but one such locomotive and none of them has more than four.

The first installations—the pioneering eight—were placed in operation in May, 1930; of these, three operated at Potts colliery, two at Reliance and three at Locust Gap, all in the Locust Summit Division. The first operation is in Columbia County and the other two in Northumberland County, all three being in a direct east-to-west line between Lo-

custdale and Mt. Carmel, Pa., and south of Broad Mountain.

In the levels and rock tunnels of these mines, as in those of the P. & R. C. & I. Co. generally, the roadways are driven on a gradient of 0.5 per cent in favor of the load, an inclination that enables the cars to travel in either direction with about equal resistance of traction and one that also gives ample fall toward the shaft or slope bottom for the drainage of water. As the coal seam dips 65 deg. or more, the breasts are all on the one side of the gangways, and the coal is delivered to cars on the tracks by gravity chutes. Accordingly no cars have to be taken into breasts and no gradients have to be surmounted greater than 0.5 per cent and these only by empty cars, except, however, when trips of loaded cars are being assembled.

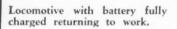
On the other hand, the gangways on the levels are by no means straight, having to conform strictly to the contours of the bed. Not being driven by sights, the gangways are subject to change in direction with every cut, and, as rock is entered on both sides of the gangway, the expense of straightening them after driving is prohibitive. To compensate for this, there are no heavy gradients as in the gangways and chambers of many northern anthracite mines and as in the headings and rooms of bituminous coal mines.

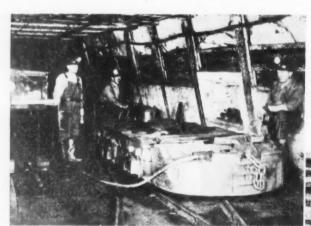
At Potts colliery, the track gage the gage is 44 in. Track is of 60-lb. steel laid on 6x7-in. hardwood untreated ties, 6 ft. long, supported by mine-rock ballast. Frogs are of solid cast manganese steel.

In the second level of Potts colliery, not a foot of trolley wire is to be found. A few mules, however, were retained after the installation of permissible battery locomotives to gather coal to the turnouts of the rock tunnels connecting the level gangways with those of other coal beds. These mules have since been largely discarded, as another of the permissible straight storage-battery locomotives has been added. All the



Motor barn, Potts Colliery, with transfer tracks showing discharged battery, lifted off locomotive chassis, on right which has been run from under one of the battery boxes by power from a transfer cable.





Locomotive chassis being moved to fully charged battery under power received through transter cable trailing beside locomotive. Front end view.

Hydraulic pump on left, with piping and controls to serve two transfer racks; also, on right, battery box under charge on transfer rack supported by four hydraulic rams. Note battery-cover lifting crank and changing cable in front of battery box and limit block on track.

coal and rock is delivered to the shaft or slope bottom by permissible

equipment.

At Reliance, permissible storage-battery locomotives are used on the Ninth Level and at Locust Gap on the Fifth Level Shaft Section and in the Third Level of the Western Spring Slope. In all instances, coal is hauled by these locomotives from the working place to the bottom. No trolley wire is installed except in Locust Gap Fifth Level, where a combination locomotive is used solely for transferring cars and supplies around the shaft bottom.

As no motor hoists are used to aid in assembling cars into a trip, the locomotives have to bump them together after they have been loaded at the chute; two empty cars usually are left at each chute and there may be four or five chutes in each group, making a trip of eight to ten cars. In all these mines the cars weigh about 7 short tons loaded and have plain bearings. Locust Gap colliery, however, has 100 roller-bearing cars weighing 10 tons loaded. The weight of a loaded trip varies from 56 to 130 tons gross, excluding the weight of the locomotive.

In the Potts colliery, the maximum haul is about 5,000 ft. one way and the average cars hauled per eight hours during April, 1937, was 180. At Gilberton colliery, a Schuylkill County mine, the Sixth Level is equipped with two permissible straight battery locomotives of 48-in.

gage, and there is no trolley wire on this level.

Each locomotive is equipped with a lead-acid battery consisting of 54 cells, and an extra battery is provided for every locomotive, so that one can be on charge while the other is in use. As soon as any battery is 80 to 90 per cent discharged or may become so during the coming run, the unit is run into the locomotive barns for replacement of the battery with one fully charged. The haulage load is so heavy that a battery will run only four or five hours.

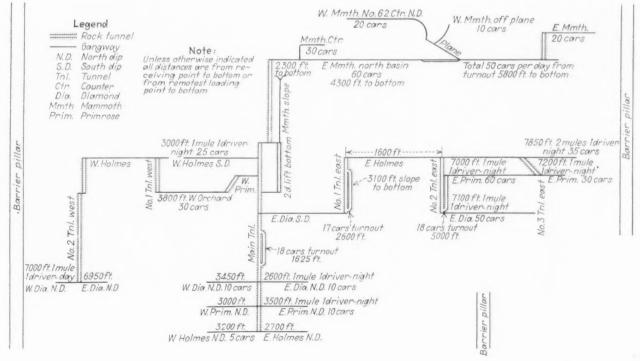
When the locomotive enters the motor barn, the motorman runs the locomotive with its discharged battery into an empty transfer rack until it lightly strikes the limit The motorman then disbumper. connects the running cables from the battery box and connects the running cables of the chassis to an electric transfer cable to energize the motors so that the chassis can be run out after the battery box is removed. The conductor pumps up the pressure on the hydraulic rams which raise the transfer rack until the side channels engage four heavy steel brackets attached to the sides of the battery box near each of the corners. The hydraulic pressure raises the battery box about 8 in, above the top of the locomotive chassis.

By means of power supplied through the transfer cable, the locomotive is run out from under the discharged battery and onto the main barn track to another transfer rack where a fully charged battery stands ready to be lowered onto the chassis. By releasing the pressure on the hydraulic rams, the fully charged battery quickly settles into position, the chassis being correctly positioned by the tracks and the limit blocks, As soon as the running cables on the chassis are disconnected from the transfer cables and connected to the running recentacle on the battery box, the locomotive is ready for service. This done, the locomotive returns to work, the entire job of battery transfer taking only three or four minutes.

As the management views it, the need for full-capacity haulage is more pressing than long battery life. It is better to get a big daily output than, by excessive care that interferes with production, to coddle the batteries into an excessively long life or to work the batteries after their capacity has greatly depreciated. Hence, the batteries are discarded after their capacity has fallen 20 per cent. Thus a battery with 60.5-kw.-hr. capacity is replaced when its capacity falls to 48.4 kw.-hr. Batteries, when new, also build up a capacity above their normal rating, sometimes as much as 10 per cent; thus the average capacity of a battery through its operating life, as limited at these mines, may be as high as 95 per cent.

A properly constructed permissible storage-battery locomotive has

Diagrammatic sketch of haulage arrangements in Potts Colliery, Second Level



only one vulnerable spot, which is that a heavy fall of rock and timbers might break the cover of the battery box and cause a short-circuiting of the cell connections. As a storage battery has an immense store of the short-circuiting and energy. grounding of the cells constitutes an ever-present hazard.

This has been met by placing along the center line of the battery box a strong channel on which the inner edges of the two lids of the battery box rest. This channel is insulated on its lower side by a heavy strip of wood held by bolts countersunk in the wood, the heads of which are covered by a sealing compound. The lids themselves are made of 18-in. sheet steel, stiffened on the edges by angle iron.

Each lid weighs approximately 500 lb., a weight too heavy for one or even two men to handle. Hence, it was necessary to provide mechanical lifting devices to open each lid, one of which is located at either end of the battery box. These mechanical lifting devices are operated in unison by spur and worm gears set in motion by a handle at one end of the battery box, and with these the lids can be opened in turn by one man, thus exposing the batteries for examination and for replenishment with distilled water.

Withstands Heavy Falls

A fall of rock or timber exceeding a ton can drop and has dropped on such lids without causing any damage to the lids or the battery. The undersides of the lids are lined with a 4-in. asbestos-board sheet as further protection in case the springing of the lids under a fall of rock or timber might damage the cells and their connections. No storagebattery locomotive is safe without a strong battery-box cover. The lids do not pivot on the edge of the battery box but on the pins of the mechanical lifting devices by which the lids are opened, so that, when they open, their outer edges slide a short distance down the sides of the battery box, making access to the batteries safe and easy.

Insulators of semi-hard rubber, mounted on two strips of wood which surround the inside of the box and are held in position by countersunk bolts with heads covered with sealing compound, are provided around the sides and ends of the battery box at intervals suitable to the battery-tray assembly. These insulators serve not only to prevent

cell breakage but also act as insulators between trays and battery box. In case any cell breaks and its acid contents be discharged from the battery box, a thin sheet-steel plate is placed under this box which guides the liberated acid to the side of the locomotive so that it cannot spill on the motor cases and damage them.

Blocking Short-Circuiting

As the batteries liberate hydrogen, ventilation is provided on the ends by a perforated plate and also by a number of 2-in, round holes in the floor plate of the battery box, which permits the emitted gas to escape readily. But the use of the perforated end plate introduces the hazard that some thoughtless person might push wires through the perforations and thereby short-circuit the cells. This is prevented by placing a baffle plate inside these perforated plates in a manner to permit air to pass over the top of the baffles but to obstruct the passage of a wire through the perforations.

The chassis weighs about six tons and is equipped with two approved motors geared to the axles by doubleor single-reduction spur gears. The control is progressive series parallel with split field. The batteries com-plete and ready for service weigh about four and one-half tons, making the total weight of the locomotive 10½ tons. One unit, however, has an aggregate weight of 13 tons.

A 30-kw. motor-generator set provides power for battery charging at Potts colliery, developing 142-volt direct current. Batteries are charged by the modified constant-potential method. For driving the motor end of the set, 440-volt 3-phase 60-cycle alternating current is provided. Should power fail, the batteries are automatically shut off the charging circuit so that they cannot reverse the motor-generator set, drive it backward and be discharged. When power is restored the set starts automatically.

the When generator voltage reaches 142, all battery circuits close automatically and charging is resumed. As each battery is fully charged, it trips itself free from the charging circuit, and the last battery reaching full charge not only trips itself free but also stops the motor-generator set.

Argument in favor of the economic advantages of straight storage-battery locomotives over other types runs along the following lines: Had combination locomotives been

installed, the required capacity of the motor-generator set would have had to be 200 kw. instead of 30 kw., with resultant higher first cost. Demand charges would have been higher because trolley and combination locomotives take their peak load demand directly from the power system, whereas with the battery locomotives all the peak loads are carried by the batteries, which gives a uniform demand for current from the power system for battery charging.

Lower levels in the anthracite region are under high rock pressure and the supporting timber sets are sometimes fractured in a short time and have to be replaced. To permit these replacements, trolley line, if it is strung, must either be cut or freed from its hangers so that it will sag to the bottom. It is not easy to restore its alignment after cutting, because it is not straight, having been strung in a sinuous gangway. Splicing sleeves have to be inserted at points where the wire is joined, and if the work is not done with perfect accuracy, some leakage occurs.

This work must be done by electricians, thus adding to the expense, because they must be dispatched specially for this admittedly minor operation and at times when the mine is not working. Pole and trolley-wire breakage occur more frequently in crooked roadways than in straight and may become an economic item, not alone for costs of replacement but because of the loss of tonnage due to delays which they entail. In any event the purchase and installation of such trolley wire, supporting accessories and guards adds to the cost, as does also the necessity for bonding the track.

Voltage Drop Less

Excessive demands for power from the battery are not accompanied by such a drop in voltage as with trolley locomotives, hence the current is not increased as much to provide the needed power, and burning of armatures is not a frequent charge on the operation of battery units.

Safety is an economic consideration of importance. Minor shocks from the trolley wire may not in themselves result fatally, but if the shock causes men to jump or fall, the movement of locomotives and cars may convert a negligible shock into a fatal or serious accident, resulting in increased compensation cost to the company.



Many more cars will follow the way of these loads, which were among the first turned out by the new plant destined to prepare coal from 150,000 acres.

CENTRALIZING PREPARATION + Elk Horn Coal's New Wayland Plant Can Handle 12,000 Tons per Day

By J. H. EDWARDS
Associate Editor, Coal Age

F AN \$800,000 appropriation for underground mechanization and other improvements at the Wayland division of the Elk Horn Coal Corporation, Wayland, Ky., approximately \$300,000 was spent for a central preparation plant and its appurtenances. This plant, put into operation Oct. 16 to prepare "Wayland Wasp Flaming Horse-power" coals, has a run-of-mine capacity of 600 tons per hour and, in addition to the primary equipment, has crushing, screening and blending facilities to process the entire feed into stoker sizes—domestic or commercial.

Special provisions for checking, effecting and controlling preparation of the coal as delivered to the plant and in the plant itself; a construction design which reduced vibration to a negligible quantity and is aimed at minimum delays and low

maintenance for many years in the future—those features together with other refinements such as power-operated car-changing extensions at the ends of loading booms have put the plant in an outstanding position.

More than 150,000 acres of corporation-owned coal-in two seams, Elkhorn No. 1 and Elkhorn No. 3lie tributary to this new central preparation plant over which it is planned to dump eventually 12,000 tons per day, three-shift operation. To reach the most distant coal, a mine haul of approximately 15 miles will be required. The tract, situated principally in Floyd and Knott counties, is in the Big Sandy-Elkhorn field, served by the Chesapeake & Ohio Ry. Inherent ash of this Wayland coal runs between 2 and 3 per cent and the percentages of ash and sulphur of channel samples average 3.65 and 0.60 respectively. Average

percentages from proximate analyses of 2-in. nut-slack are as follows: moisture, 2.68; volatile matter, 37.40; fixed carbon, 55.73; ash, 4.19; sulphur, 0.78. Ash-fusion temperature averages 2.480 deg. F

averages 2,480 deg. F.

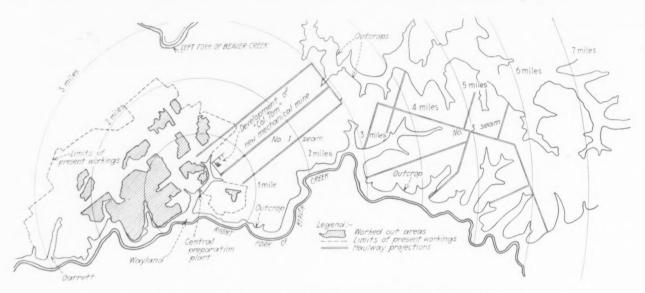
Mines of this Wayland division have been operated in the No. 1 seam since 1912 and for many years the output has been shipped from two plants, one at Wayland and the other at Garrett. The old plants were improved from time to time and only two years ago stoker-coal equipment was installed, but they could not be revised to measure up with the plans for expansion and improvement. The new preparation plant was built to centralize operations, provide better preparation and increase capacity. The location is

350 ft. upgrade from the old Wayland tipple, in which vicinity the No. 1 seam outcrops at tipple height.

New territory beginning less than one-half mile from the new plant is being developed as a full-mechanical mine. It is named the "Col. Tom" mine, in honor of Col. Thomas S. Haymond, formerly general manager of the corporation and now a member of the National Bituminous Coal Commission. In this development, now being operated three shifts and producing 1,000 tons per day, three Jeffrey chain-flight conveyor units load into mine cars. Each unit consists of three 300-ft. room conveyors, one 300-ft. heading conveyor and

pose that money can buy was the goal of the management in the new central preparation plant. Provision also is made for the addition of mechanical cleaning if later it may be found necessary by reason of mechanical loading. Automatic weighing of rejects as a check on preparation, a floating power drive for the main screens, 100 per cent concreteand-steel construction, and the use of Timken bearings on conveyor and machinery shafts tell a story of the progressive objectives. Trips of forty to sixty 5-ton mine cars, advanced by trip feeder, are dumped entrain in a two-car rotary dump. From 6-ton motor-driven weigh basdirect by chute on the slack track or can be conveyed to the primary vibrating screens along with the $1\frac{1}{2}x0$ -in, from the shaker screens.

The $2x1\frac{1}{4}$ -in, going over the primary vibrating screens passes next into a slow-speed ring crusher designed to crush to $1\frac{1}{4}$ -in, without any oversize. After being recombined with the $1\frac{1}{4}x0$ -in, throughproduct this crushed product is conveyed to a battery of five 4x10-ft, high-speed secondary vibrating screens. Separation here, with the decks being used at present, is into $1\frac{1}{4}x\frac{3}{8}$ -in, stoker and a $\frac{3}{8}$ -in, slack. The former can be loaded over the stoker boom or conveyed and ele-



Most of the territory shown in this map covers Elk Horn Coal Corporation coal which will be hauled to the Wayland plant. In addition there is a vast acreage lying as a continuation beyond the upper center of the map.

one 42-it. cross-conveyor. One Joy 8BU loader is now being used and also one Sullivan Type 7AU cutter with 9-ft. bar. The other cutting machines operating with the conveyors are 12AA Goodman shortwalls from the old mine and some of them are equipped with 10-ft. bars. The coal is being shot with Cardox. It is planned to produce 5,000 tons per day from this mechanical mine,

Thickness of the No. 1 seam ranges between 40 and 56 in. and averages 42 in. Five hundred new steel mine cars 27 in. high and carrying 5 tons have been received (for details see p. 66). Haulways are being graded and built to provide transportation facilities comparable with the trackage of railroads. An 800-ft. outside haul recently built reduces the main haul by 3 mile.

Equipment from mine-car feeder to railroad-car loading points the best and most complete for the purkets, one under each half of the dump, the coal passes to a 12-ton hopper, from which it is fed by a reciprocating plate to a run-of-mine conveyor which elevates to the top of the shaker screens.

A four-way separation is made on these main shakers and three sizeslump, egg and stove-pass directly to their respective tables, where they are hand-picked and boom-loaded. The fourth size, at present $1\frac{1}{2}x0$ in., is belt-conveyed over a trampiron magnetic separating pulley to two 6x14-ft. primary vibrating screens or can be loaded direct into railway cars through a bifurcated hinged chute on the slack track. Operating at the ends of the lump, egg and stove loading booms is a remixing conveyor which permits reassembling any of the picked sizes for loading. This conveyor also can be used to carry these sizes to the main crusher. Thus reduced to a 2x0-in, size, the coal can be loaded vated to a 30-ton stoker bin farther down the track. The \(\frac{1}{2}x0-in. \) can be conveyed to the loading chute of the slack track or conveyed and elevated to a 60-ton slack bin situated beside the stoker bin.

Under each bin is an apron feeder discharging to a common bifurcated car-change loading chute on the stoker track and through which any blend can be loaded. Feed from the stoker bin is regulated by a rack-and-pinion gate, and that from the slack bin by a setting of feeder speed anywhere in a four-to-one range. Degradation of $1\frac{1}{4}x\frac{2}{3}$ -in. entering the stoker bin is held to a minimum by a spiral lowering chute in the center of that bin.

The car feeder, which is situated on the empty side of the dump, engages the car bumpers and the loaded and empty tracks are on level grade; i.e., 90 ft. of the approach to the dump and 780 ft. on the empty side. Seven empty cars are retained on

the empty side of the dump in order to effect a connection with a new trip of loads. To make this connection the car feeder is reversed and the seven cars are backed through the dump far enough to couple to the end of the loaded trip where it was dropped by the main haulage locomotive as the latter left by a switch installed close to the dump.

An air-operated fly gate under the first or inby section of the rotary dump provides for bypassing mine rock around the coal weigh basket and over a reciprocating feeder to a reject belt 42 in. wide and 300 ft. long, center to center. This rock falls into a 100-ton bin from which it is hoisted up a mountainside incline by equipment formerly used for disposal from the old tipple. Over this incline and through a fill of loose slate a concrete underpass was built to accommodate the loaded track extended to the new plant.

Detailed inspection of individual mine-car loads of coal selected because of a suspected dirty condition is provided for by another air-operated fly gate under the weigh basket of the outby section of the rotary dump. This gate diverts the coal over a scraper conveyor and reciprocating feeder to an inspection table. From there it can be delivered to the r.o.m. conveyor or wasted to the ground.

In order to control preparation with more accuracy than heretofore possible, the quantity of reject from the plant preparation is automatically weighed and recorded. Thus both loaders and seam sections can be investigated and definitely checked. This weighing is effected in a 1,000-lb, weigh basket interposed between the discharge of the reject conveyor



Looking up at the bottom of the stoker boom showing the airoperated car-changing chute in its retracted position

and the rock conveyor. A Fair-banks Printomatic springless weigher scale records the number of 1,000-lb. baskets of reject delivered to the rock belt.

Operation of the weigh basket to valve the 1,000-lb, loads is controlled automatically by an electric eye whose light beam enters through a hole in the scale indicating dial. Feed to the weigh basket closes when an adjustable pointer on the scale dial moves to a position which masks the light beam from the electric eye. Two other scales of the same type but without electric eyes function with the coal weigh baskets.

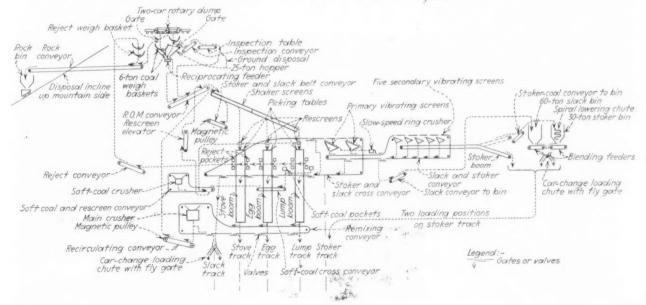
The main shaker screens are equipped to accommodate veil plates for the egg screening surface which will permit the separating of a 2-in. lump size. This product will split in equal proportions between the lump and egg booms to facilitate picking. Rescreens are provided for the lump, egg and stove sizes at points just before these coals pass onto the respective picking tables. The discharge ends of their chutes are equipped with Fairmont's patented "Perfect Discharge Noses" to provide gentle flow onto the picking tables.

Any soft coal that reaches the lump or egg picking tables is picked out and conveyed to a soft-coal crusher. The crushed product, together with any coal that passes through the rescreens, is elevated to the r.o.m. conveyor for resizing. Numerous gates or valves in chutes and conveyor troughs provide for diverting sizes to various points and equipment to suit every conceivable demand. All booms and loading chutes are provided with sprays to apply Dustlix treatment.

The plant was designed and built by the Fairmont Machinery Co.; foundations were erected by the coal corporation, and the electric wiring was installed by the Barnes & Brass Electric Co., of Clarksburg, W. Va. The main building is 78x99 ft. exclusive of wings at each side which extend upgrade and downgrade over the stoker track. The car feeder and the rotary dump, which is electric-motor driven and makes a complete revolution, were manufactured by Link-Belt.

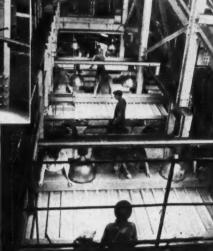
In addition to the 42-in. x 300-ft. rock belt, the plant contains three other belt conveyors and all are Goodyear Style B belts. Six-ply 28-oz, weight is used for all but the reject belt, which is 4-ply. Rubber

Planned to handle ultimately 12,000 tons per day and equipped to prepare it all as stoker fuel





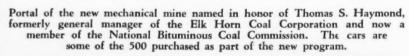
Five 4x10-ft. high-speed vibrating screens separate the slack from the stoker

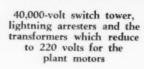


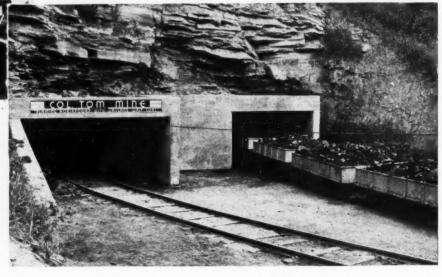
Pickers lined up at the tables ready for the starting whistle. Two 400-watt high-intensity mercury lamps provide the best known illumination for detecting impurities.



Dumping en train in a two-car rotary dump

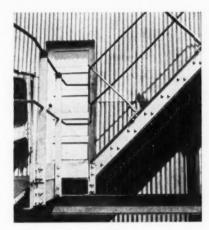






facing of the rock belt is $\frac{1}{16}$ and $\frac{1}{3}$ 2 in. and of the recirculating, stoker-slack and reject belts is $\frac{1}{8}$ -in. and $\frac{1}{3}$ 2-in. Belt idlers are Link-Belt with Timken bearings and high-pressure lubrication fittings.

Shaker screens which consist of two balanced sections 10 ft. wide make up a total length of 65 ft. Their drive, the Murry patented floating type, which is in use in several other plants (Coal Age, July 1934, p. 277, and October 1935, p. 414), consists of a motor and crankshaft platform suspended by pendulum hangers. It is eminently successful in holding the vibration of the steel building structure to a minimum far under that usual with such a heavy screen.



Typical of the railing construction consisting of rods arc-welded into continuous rails.

Chutes from loading-boom ends to the remixing conveyor are entirely automatic in that they move into position when the boom is raised and move back when the boom is lowered. For changing cars without stopping the tipple, three of the booms-egg, stove and stoker-are each equipped with a hinged chute which is operated by a Curtiss Pneumatic trunnioned air cylinder. This chute, of 4-in. steel plate, normally rests in a parallel position up close under the boom. As it is extended for car changing it pivots down at an angle with the boom. Lump output of the plant is not sufficient to warrant having the chute equipment on the lump loading boom.

The two primary vibrating screens are Robins Gyrex and the five secondaries are the Vibrex of the same manufacturer. Magnetic drive pulleys at the heads of the recirculating and stoker-slack conveyors are Stearns. Coal crushers are as follows: main, 36x54-in., Jeffrey single-roll; secondary, Pennsylvania Steel-

built, slow-speed, ring type, Trojan series, size 4; and soft-coal, Mc-Lanahan & Stone, 18x18-in. single roll.

Timken-bearing pillow blocks are used on all conveyor and machinery shafts of 5-in, diameter and less, and Fairmont standard sleeve bearings on the few shafts which are larger than 5 in. Gears are made of cast steel with cut teeth and they mesh with steel pinions. Cleveland reducers are used in six instances on motor drives of 10 to 50 hp. Boom hoists of 5 tons capacity were made by Robbins & Meyers. Fairmont heavy-duty car retarders are used on stoker and slack tracks and the standard type on the lump, egg and stove tracks. All retarders are mounted on separate masts which relieve the tipple of possible damage in case of a runaway railroad car. The slack track is equipped with a Brown-Fayro layer-loading hoist capable of shuttling several cars at a time, this in order to attain a loading that assures an even ash curve. Conveyor chains and rollers are lubricated by manual opening of valves which spray a light oil from a permanent piping system and fixed nozzles of a type similar to those used for dustless treatment of the coal.

Forty-six motors ranging from 3 to 150 hp. and making a total connected-horsepower of 832 drive the plant. All except one motor—a 150-hp. Westinghouse wound-rotor type operating on 2,300 volts, which was moved from the corporation's Fleming division and drives the main crusher—are 220-volt squirrel-cage type. The other motors of the plant

are General Electric and all except four are new. Seven totally inclosed fan-cooled ball-bearing motors drive the vibrating screens, $7\frac{1}{2}$ -hp. on the primaries and 5-hp, on the secondaries. Three new 40,000/220-volt 200-kva. transil-oil-type transformers mounted under a steel tower adjacent to the tipple reduce the purchased power to the lower voltage for tipple motors. Thyrite arresters provide lightning protection on the 40,000volt side. Transformers, arresters and switch tower also were furnished by the General Electric Co. The one 2.300-volt motor is fed separately from an old transformer bank which supplied the displaced tipple.

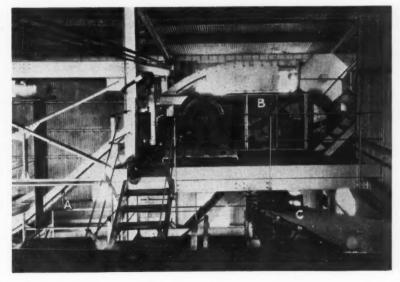
Magnetic starters (all General Electric) are mounted in a partitioned and covered room in a corner of the tipple on the side adjacent to the switch tower. Each motor is Economy fused in a Wurdak safety fused switch. Sequence starting is not used in the plant but instead the buttons of the bench-type control board are positioned in the proper sequence of starting and the tipple operator must push each button separately. Stop buttons are provided in several locations about the plant for emergency opening of an automatic trip oil switch in the main 220-volt feeder coming from the transformers. Rigid conduit is used throughout the plant to protect and isolate motor and light wiring.

Lamps for general lighting are 100- and 200-watt Mazdas in opentype porcelain enameled reflectors. Picking-table lighting is supplied by Westinghouse 400-watt high-intensity mercury-vapor units, two over each table with the exception of the

"A" is the remixing conveyor elevating to the main crusher, "B."

Belt "C," the recirculating conveyor from crusher to shaker

screens, has a magnetic pulley at the head end.



inspection table, where only one is used.

The air compressor for operation of fly gates and boom-chute car changers is in a ground-floor room which also houses a motor-generator for supplying d.c. to the magnetic separator pulleys. This compressor is an Ingersoll-Rand air-cooled three-cylinder, size 5x5-in. and 4x4-in. The motor-generator consists of a General Electric 10-hp. a.c. motor direct-connected to a Westinghouse type SK 7½-kw. generator.

Sheeting of the dump house, convevor galleries, bins and main building is corrugated galvanized steel (2 oz. zinc per square foot)-No. 22 gage on the roof and No. 24 gage on the sides. Steel structure and equipment are painted with aluminum applied after erection. Over the inspection table, scale house, picking tables and in the rescreen plant are skylights of corrugated wire glass of 1,320 ft. aggregate area. Stair treads are "Electroforged" steel gratings made by the Blaw-Knox Co. Hand railings consist of rods threaded through holes in posts of bar steel and arc-welded into continuous lengths. Also the rods are lightly arc-welded to individual posts to keep the latter from being bent the flat, or weak, direction.

Specially Designed Cars Used

The new mine cars, made by the American Car & Foundry Co. and designed especially for mechanical loading, have a bottom-hinged bodyend construction which for hand loading also has proved a great advantage. Principal dimensions and specifications of the car are: width, 7 ft.; length over all, 13 ft. 3 in.; height above rail, 27 in.; level capacity, 122 cu.ft.; wheels, 14-in. Naco cast steel; Timken bearings, No. 477-472-A; four axles, $2\frac{3}{4}$ -in., open-hearth special 0.40 to 0.50 carbon steel; wheelbase, 50 in.; track gage, 42 in.; cast-steel sill and bumper construction; wheel hoods and floor of 4-in. copper-bearing steel; double-action bumper at one end only; no brakes; swivel couplings; gravity dog to hold coupling pin from falling out during rotation of the dump; and a metal loop riveted to the lower side of car bottom at the outby end to provide a point of attachment for a safety blocking chain while in the working

It is planned that within a short time the daily production of this Wayland plant will be raised to make it the largest producer of stoker coal in the country. Executives and officials of the Elk Horn Coal Corporation, who have been intimately concerned with the planning, construction and operation of the new plant and other improvements, are: president, C. W. Watson, Cincinnati; executive vice-president, R. H. Kelly, Cincinnati; vice-president in charge of sales, J. H. Baker, Cincinnati; general manager of sales, Carter

Schupp, Cincinnati; chief engineer, George Pow, Wayland; division engineer, J. A. C. Haymond, Wayland; and division manager, A. B. Brooke. Col. Thomas S. Haymond had a large part in the planning of these improvements, which were already under way when he left the service of the corporation to join the National Bituminous Coal Commission.

Machinery and Motor Drive Data, Wayland Plant

Speed

	Feet or	Motors			
	Strokes		Horse-		
Equipment		Number			Drive
Trip feeder, chain, 21 ft. c.c	75	1	50	900	Herringbone reducer and gears
Two-car rotary dump		1		,200/600	Herringbone reducer
Weigh baskets		4	5	70	Gearmotors
7 in	43	1	10	1.200	V-belts and gears
t.p.h., 60 in. x 86 ft. c.c	100	1	50	900	V-belts and gears
Shaker screens, 10 ft. wide, 14-deg., with Murry patented floating					
power		1	30	900	V-belts
Lump picking table and loading boom, apron, 60-in., 26-ft. hori-					
zontal section, 36-ft. hinged section.	70	1	10	1.200	Worm reducer and gears
Stove picking table and loading			20	1.200	TO THE TOTAL OF THE BOTTON
boom, apron, 60-in., 26-ft. horizontal section, 36-ft. hinged					
Section	70	1	10	1,200	Worm reducer and gears
boom, apron, 60-in., 26-ft. hori-					
zontal section, 36-ft. hinged section	70	1	10	1,200	Worm reducer and gears
Stoker conveyor and loading boom,	***		40	1,200	TO COME TO COME TO COME BOTTON
apron, 60-in. 63-ft. horizontal section, 36-ft. hinged section	110	1	20	1,200	Herringbone reducer and
Remixing conveyor, flight, 42 in.					gears
x 60 ft. c.c	100	1	25	1.200	V-belts and gears
Main crusher, 36 x 54-in. sing'e		1	150	600	V-belts
Recirculating belt, 36 in. x 60 ft.					
Stoker and slack belt, 36 in. x 25 ft.	300	1	15	1.200	V-belts and gears
Stoker and slack cross conveyor,	300	1	5	1.200	V-belts and gears
flight, 42 in. x 80 ft. c.c	125	1	75	1,200	V-belts and gears
Two primary vibrating screens, 6 x 14 ft		2	71	1.800	V-belts
Slow-speed ring crusher, 200 to 225 tons per hour		1	100	1,200	V-belts
Slack and stoker conveyor to		1	100	1,200	v-Derts
secondary screens, flight, 42 in. x 76 ft. c.c.	125	1	50	1.200	V-belts and gears
Five secondary vibrating screens.		5			
4 x 10 ft			5	1.800	V-belts
flight, 18 in. x 80 ft. c.c Soft-coal crusher, 18 x 18-in. single	100	1	5	900	V-belts and gears
roll		. 1	71	900	V-belts
Rescreen elevator, bucket, 30 ft. c.c.; casing, 13\frac{1}{4} \times 42 in	230	1	5	1,200	V-belts and gears
Reject belt, 16 in. x 160 ft. c.c	150	1	5	1,200	V-belts and gears
Rock feeder, reciprocating, 36 in. x 6 ft. 7 in	43	1	5	1.200	V-belts and gears
Rock belt, 42 in. x 300 ft. c.c Air compressor, air-cooled, 2-stage,	150	1	20	900	V-belts and gears
57 c.f.m		1	15	1.200	V-belts
Soft-coal conveyor, drag chain, 12 in. x 18 ft. c.c.	100	1	5	22	Gearmotor
Inspection scraper conveyor, flight,					
36 in. x 48 ft. c.c., and with same drive: inspection feeder, recipro-					
cating, 48 in. x 5 ft. 7 in	100 30	1	71	900	V-belts and gears
Inspection table, apron, 60 in. x	50	1	5	1 900	V helte and many
10 ft. c.c				1,200	V-belts and gears
x 65 ft. c.c	100	1	20	900	V-belts and gears
48 in. x 56 ft. c.c	125	1	20	900	V-belts and gears
Slack blending feeder, apron, 48 in. x 15 ft. c.c	100	1	5	1,200	P. I. V. gear
Stoker blending feeder, apron, 48 in x 7 ft. c.c	100	1	5	1.200	
Four boom hoists, 5-ton		4	3	1.200	V-belts and gears Direct geared
Generator to supply d.c. to magnetic pulleys		1	10	1.750	Direct
Total		46	842		
		40	0.40		

ROLE OF RESEARCH

+ In Winning Markets for Coal Emphasized at N.C.A. Convention

TEFLECTING the growing interest of the bituminous industry in activities in the marketplace, research and sales promotion loomed larger than ever on the program for the annual meeting of the National Coal Association, held Oct. 7 and 8 at the William Penn Hotel, Pittsburgh, Pa. Few speakers failed to allude to one or both of these factors affecting the future prospects of the industry, and the place of the household stoker in the movement was recognized not only in making up the program but also in an exhibition of equipment and controls by the Stoker Manufacturers' Association.

Coal-research advocates at Pittsburgh included J. P. Williams, Jr., president, Koppers Coal Co., Pittsburgh, Pa., retiring association president; Marc G. Bluth, executive secretary, Committee of Ten-Coal and Heating Industries, Chicago; John C. Cosgrove, president, Bituminous Coal Research, Inc., Johnstown, Pa., and H. H. Lowry, director of the coal research laboratory, Carnegie Institute of Technology, Pittsburgh, That the bituminous industry too long has lagged in the conduct of research into the nature of coal and its utilizations and has too long neglected to stem losses to competing fuels by aggressive market promotion and advertising was the forthright opinion expressed by Charles F. Hosford, Jr., chairman, National Bituminous Coal Commission, Washington, D. C., in discussing the future of the industry (see report beginning on p. 53).

Market-promotion possibilities and methods were stressed by not only Messrs. Williams, Bluth and Hosford but also by J. D. Battle, executive secretary, National Coal Association, Washington, D. C.; Charles O'Neill, president, United Eastern Coal Sales Corporation, New York, and chairman of the association's

government and public relations committee; J. E. Martin, manager, stoker division, Link-Belt Co., and Howard S. Davidson, Chicago manager, Better Homes & Gardens. Participants in the forum on coal-marketing agencies (see other meeting report, p. 53 of this issue), which included R. E. Howe, president, Appalachian Coals, Inc., Cincinnati, Ohio; Herbert S. Salmon, president, Alabama Coals, Inc., Birmingham, and William G. Caperton, president, Smokeless Coal Corporation, New York, also emphasized market promotion and particularly the opportunities of sales agencies in this field. Contrasting the work in other industries-specifically oil-with that in coal, Mr. Williams urged increased funds and greater support for both research and market promotion.



Why Sell Raw Coal?

"This industry," said J. P. Williams, president, National Coal Association, at its annual convention, probably spends twenty to twentyfive million dollars annually in modernization of its plants, to lower production costs and better prepare its product for the mar-kets. All of this we pass on to our customers without any proper might well take a leaf from the history of oil companies, who origi-nally produced crude petroleum and sold it in cut-throat competition. Now, with their great re-search staffs and large refineries, they are making hundreds of products and selling them direct to the consumer. Is there any good reason why a coal company, or a group of coal companies, should not own and control chemical works, gas works, tar distilleries, etc.? It is not a new thought but has been done abroad for years, with results that make our industry in this country look like a pauper."

Changing times, a better business outlook, increasing competition from competitive fuels and the big strides in the manufacture and sale of automatic coal-burning equipment have warranted the association in embarking on a systematic and continuing market-promotion campaign, said Mr. Battle in offering his report as executive secretary. Within the last few months, the first national advertisement in the history of the bituminous industry was released in conjunction with the Stoker Manufacturers' Association, supplemented by distribution of over a million copies in book form to prospective home owners, builders and those interested in modernizing their dwellings. This was followed by an educational pamphlet for home owners, architects, builders and others, 200,000 copies to

Preparation and publication of a series of advertisements in leading architectural and builders' magazines was the next step, and distribution of plans for basements and coal bins drawn to scale for use in home construction is meeting a hearty response in its initial stages. "The next move is a pamphlet containing these plans in miniature for very wide distribution, with a message to coal producers as to how the booklet should be used, as well as a message to coal dealers and all others concerned. This is just the beginning, we hope, of a systematic campaign of advertising," with the basic idea of first preparing the bituminous industry to take the proper steps if and when the time for creating a real consumer demand for all kinds of coal heat comes. "Once our own people are thoroughly sold on the need for these efforts, we hope to move on to some direct appeal to the consumer through national publications, the radio and moving pictures.

The Committee of Ten, now comprising thirteen affiliated organiza-

tions, has strengthened its work of promoting public acceptance of solid fuels and of coordinating the research, equipment design and application and market-promotion work of its members, said Mr. Bluth in his report to the association. Pointing to the need for additional funds and reiterating the contention that coal should keep pace with other industries, Mr. Cosgrove reviewed the work of Bituminous Coal Research, Inc., in a formal report to the association. So far, the organization has completed about 2½ years of the three-year program originally contemplated. Some progress has been made and some of the conclusions already are being put to use by the industry. Of the eight publications to date, three are entirely exhausted.

In addition to its own funds, the corporation has been benefited by grants of \$30,000 from institutions designated to carry on its research

program.

Bituminous Coal Research, Inc., is concerned only with problems general throughout the industry, Mr. Cosgrove pointed out. Included in these problems is an investigation of coal-hydrogenation in preparation for the future when oil supplies will decrease and prices will increase, a study of the relative cost of heating with oil, natural gas, bituminous coal and coke (carried on in various homes in Columbus, Ohio) and tests of a fuel-bed agitator to break up coke trees in stokers. "The program of research is by no means confined to the domestic use of coal, although this was stressed in the first year. The research committee has recognized that the selection of coal for the industrial stoker was a problem that was far from satisfactorily solved." Also, to determine just what takes place in the fuel bed when coal is burned in a big steam plant, experiments are being conducted at the Hell Gate station of the Consolidated Edison Co., New York. A cooperative program on the problems involved in oil-treating coal to allay dust is another major investigation going forward with the cooperation of several oil companies.

In reporting on research abroad, as observed on a three-months' trip this year, Dr. Lowry pointed out that the British Fuel Research Station operates on annual appropriations averaging about \$450,000, in addition to \$250,000 for the Safety in Mines Research Board. In Russia, the annual budget may be considered equivalent to about \$6,000,000 spent in this country. In practically every country visited, in addition to other research problems, investigations into the production of liquid fuels were in

How to Sell More Coal

More coal sales in the future in an increasingly competitive market, said Howard S. Davidson, Chicago manager, Better Homes & Gardens, at the National Coal Association's Pittsburgh Meeting, demand:

(1) National cooperation in the promotion of coal; (2) adoption of a basically sound promotional program on which various kinds of structures can be erected as progress is made; (3) education and stimulation of building tradesmen; (4) search for a promotional theme and development of a will to stick to it; (5) cultivation of the new-home market; (6) retention of the existing home market; (7) cooperation with the stoker industry; (8) cooperation with the furnace industry. Advertising—cooperative advertising on a national scale—is vital, and efforts in other industries have proved its soundness.



progress, using two major types of processes: the Bergius-I.G. and the Fischer-Tropsch, or Ruhrchemie. Coal hydrogenation and improved water-gas production are important subjects in Great Britain, Germany and Russia, the countries to which Dr. Lowry confined his spoken remarks.

"The most striking conclusion of this survey of world coal research is the dearth of original ideas. Empirical tests, slightly modified from laboratory to laboratory the world around, form the basis of the research programs. More rapid technical progress cannot be made until this situation is remedied. To my mind, the remedy is to be found only in an intensive study of the nature of coal and of the fundamentals of processes using coal. Recognition of the complexities in such a study has been given in the past. What is needed is the courage to attack these complexities with the full knowledge that their solution is not just around the corner. However, when this goal is reached, progress in the utilization of coal will come at an increasingly rapid pace. Coal thereby will be given an increased value which should be reflected in the price obtained by the producers in proportion to their share in proving the increased value.'

Coal men striving to promote the use of solid fuel have the stoker industry as a fighting ally, declared Mr. Martin, who called for an end to passive resistance to the encroachment of rivals. "As manufacturers of automatic coal burners, we assume the responsibility of directing the

sales efforts of our distributors and dealers. By the use of advertising, sales education and close association we try to instill in these representatives of ours the same enthusiasm for automatic heat with coal that we have. As producers of coal you are in a position to exert this same influence on your wholesale and retail outlets. It is in a large measure your responsibility, and perhaps your salvation, to convince those of your dealers who doubt it that the day is past when the coal merchant can carry a supply of good-quality coal and challenge his customers to come in and buy it."

The real beginning of the automatic heating era was in 1922, but it was not until 1932 that the home stoker began to move in some volume. In 1935, about four oil burners were sold for every stoker. Available information indicates a ratio of two to one in 1937, and by 1938, if the proper effort is exerted, one stoker can be installed for every oil burner. Many problems still remain, however, of which one is the lag in the adoption of coal heatingeither hand or automatic-in new homes being built. The industry has something to offer this market in improved stokers paralleled by improvements in the coal-sizing and cleanliness situations. But, if results are to be secured, cooperation by the coal industry in the realms of advertising and market promotion must be intensified.

After hitting its low in 1933-34, activity in building has again started on an upward swing which, it is estimated, should reach its peak about 1943, said Mr. Davidson. Accordingly, now is the time for the bituminous industry to take its message of convenience, economy, dependability to the public. This is particularly important in that residential buildings now lead all others, with single-family units as the most important single class. Remodeling and upkeep also are of major moment, with kitchens and basements as the center of most activities in this

category

Only one-seventh of the nation's residences have automatic heat, made up of: oil-fired units, 9 per cent; gas, 4 per cent; and stokers, 2 per cent. Hand-firing coal users constitute 40 per cent of the total and stove users, 45 per cent. The public now is conscious of automatic heat, but modern coal heating is lagging in new homes, as evidenced by the following percentage preferences in fuel and methods: hand-fired coal, 34 per cent; stokers, 8 per cent; oil, 27 per cent; gas, 25 per cent, others, 6 per cent.

RELIANCE MODERNIZATION

+ Fits Underground and Surface Activities To Mechanical-Loading Conditions

By C. E. SWANN

Chief Engineer, Union Pacific Coal Co. Rock Springs, Wyo.

O BRING the operation in line with modern practice, the Union Pacific Coal Co. has expended a quarter of a million dollars in modernizing its Reliance property, at Reliance, near Rock Springs, Wyo., with additional heavy cash outlays scheduled for the next two years for equipment as workings in a new seam are opened An outgrowth of underground mechanization, the modernization program has involved extensive revisions in haulage roads, track-con-struction standards and transportation equipment, in addition to the construction of a modern steel tipple to serve both the present and new

workings.

Reliance No. 1 mine was opened in 1910 to replace Rock Springs No. I mine, then being abandoned after working continuously since its opening in the No. 1 seam in 1868. Rock Springs No. 1 had an average daily production of 2,000 tons and employed the room-and-pillar system with hand loading. When it was closed down a large quantity of equipment was left over which would have had only scrap value unless some place was found for its utilization. Mechanical loading of coal was in its infancy in western America, and it naturally followed that this equipment would find its way into the new camp, where handloading methods were to be adopted.

Cutting of coal with mining machines had by this time become standard practice, but loading coal mechanically had not yet assumed a definite place in the coal-mining industry. While the operating personnel was convinced that the 30-ingage track in Rock Springs No. 1

mine should not be repeated in a new camp, it was found difficult to offset the argument that use should be made of the equipment available as a result of the abandonment of Rock Springs No. 1.

Reliance No. 1 mine was opened by a slope driven down on the pitch of the seam from a point on the out-

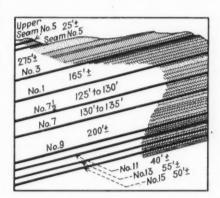


Fig. 1—Geological section, Rock Springs coal measures

crop approximately one mile east of the available railroad-track location. An endless-rope haulage system was installed to lower the mine cars to a temporary tipple, which layout worked satisfactorily as long as a large part of the coal was loaded by hand and until an increase in the daily output of this camp became desirable.

While Reliance No. 1 mine (No. 1 seam) was in operation, outcrop

prospecting and diamond drilling of the seams below No. 1 (Fig. 1) continued, and a slope was driven down the pitch on the No. 71, or first workable, seam below No. 1, the coal being handled over the endless-rope system to the tipple. This condition forced the use of the 30in.-gage track in the new workings, as well as the employment of cars similar to those in No. 1 mine. set-up, although an undesirable method of operating a comparatively new long-lived mining property, gave satisfactory results until the advent, about 1930, of 100-per-cent mechanical loading, which reduced the mine-car capacity to bed loads of coal. Formerly, as much coal was carried above the car body as in it by hand chunking about 11 ft. over the top of the cars. Car capacity thus was reduced from about 4,200 lb. hand loaded to 2,800 lb. mechanically loaded, necessitating the handling of about one-third more cars to obtain the same tonnage as before. Operation on this basis proved thoroughly that the small mine cars were a detriment to the efficient operation of a 100-per-cent mechanical-loading mine, even though the cars were filled by passing them through the loading station in trips, thus minimizing car-changing time.

When it was decided, in 1933, that the old system could not be continued longer without a material increase in cost of production, and it also became desirable to double

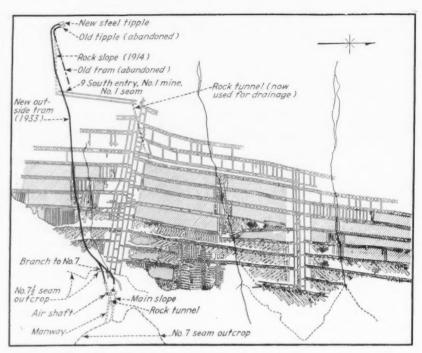


Fig. 2—Plan of workings, No. $7\frac{1}{2}$ seam, Reliance No. 1 mine, showing tram lines, rock tunnels, etc., and start of workings in No. 7 seam

production from this district, the management instructed the engineering and operating departments to devise ways and means of changing the system so that a modern mining plant would result.

A 15-deg, rock slope had been driven in 1914 from a point near the old tipple to the No. 1 seam (Fig. 2) supplemented by a motor road in the coal to connect with the No. 1 mine main slope. This motor road was completed in 1916, and in 1931 a rock tunnel was driven across the strata from it to connect with the No. 71 seam main slope. This rock tunnel could be extended across the strata to pick up the No. 7 seam, 125 ft. below the No. $7\frac{1}{2}$. In the 1933 study this set-up was abandoned in favor of an outside tram road 6,700 ft. long on a grade of 2 per cent in favor of the loads which would extend from the new tipple site to the mouth of No. 1 mine, No. 71 seam, and eventually, by additional outside tram and short rock tunnel, pick up the No. 7 seam. The No. 11 seam, 200 ft. below No. 7, can be picked up by driving a rock tunnel across the strata from the No. 7 seam tram road. This arrangement insures a long-lived mining proposition which justified the construction of a modern, largecapacity steel tipple at this location.

The complete modernization plan for this property consisted of constructing the 6,700-ft.-long outside tram road and changing the track gage from 30 to 42 in., purchasing 350 4-ton-capacity composite steel and wood mine cars and other new mine equipment, changing the gage of some of the mine equipment on hand, constructing a modern steel tipple with a capacity of 500 tons of screened and picked coal per hour and opening a new mine in the No. 7 seam, all entailing an initial expenditure of over a quarter million dollars, with heavy additional expenditures for mine cars and mine equipment, as the mine in No. 7 seam is opened up to capacity during the next two years.

This program had to be carried out while the mines were in operation and with a minimum shutdown period during the summer season of 1936 to change over from the old to the new system. The 350 new mine cars more than replaced all the old mine cars in use at the time of the change-over. During 1937, purchases for the operation included four 6-ton electric locomotives, seven shortwall mining machines, seven loading machines, seven drilling machines and two pumps. Additional machinery will be added as development work in the No. 7 seam progresses.

After 1933, all development work in the mine was arranged to accommodate the 4-ton-capacity 42-in.-gage mine cars; i.e., ties to suit the 42-in.-gage track were installed, the low-side rail and trolley line were permanently located and a temporary rail was laid on the upper side of the haulageways for the use of the

30-in.-gage equipment until such time as the change-over could be made. On account of the large amount of development work already driven by 1933, which would have had to be revamped to accommodate the 42-in.-gage equipment, it was decided to construct only the outside tram road during 1935. One rail and the trolley line were set in the permanent location for the 42-in.gage track, a temporary rail was placed on the 30-in. gage and a temporary landing was made on tram road to connect with the old tipple in order to reduce to a minimum the track change-over in the mines when the new equipment was installed.

Tipple Completed in 1936

The concrete foundations for the new steel tipple were constructed during the last quarter of 1935, but, due to slow delivery of steel, the plant was not put into full operation until Aug. 10, 1936. This modern tipple, loading coal on five railroad tracks, together with necessary changes to coordinate the new system, completed the intensive improvement program which had been carried on during 1935 and 1936. Also, the 350 new pit cars, suitable for mechanical mining and faster haul-These age, were placed in service. cars have steel-constructed bodies of the solid type with an oak bottom protected by a steel plate. Capacity, as noted above, is 4 tons of coal mechanically loaded. Trucks are fitted with tapered-roller-bearing wheels, and all four wheels are equipped with automobile-type mechanical brakes. Twenty-four of these cars, holding approximately 100 tons of coal, are handled by a 15-ton electric motor on the motor line to the tipple.

After the trips are unhooked at the tipple, the loads travel by gravity onto a feeder which controls the movement of the cars over an automatic scale and into the rotary gravity dump, where the contents are discharged against a curved dumping shield with long fingers on the lower edge to allow the fines to pass through and cushion the fall of the larger sizes into a 75-ton hopper. At the bottom of the hopper is a reciprocating feeder with a variable throw (1- to 6-in. adjustment) which regulates the quantity of coal placed on the main conveyor belt carrying the coal to the screens.

A 48-in. rubber-covered belt, traveling at a speed of 310 f.p.m. and capable of handling 500 tons of coal per hour, is used for the main conveyor. This conveyor, on an 18-

deg. pitch and with head and tail pulleys on 90-ft. centers, elevates the coal 27 ft. 9 in. The head, or drive, pulley is a 36-in.-diameter high-intensity magnetic pulley, 50 in. wide for deflecting all metallic, magnetic substances into a separate discharge chute. The coal stream feeds directly on the upper shaker screen.

The screen unit consists of an upper and a lower shaker, 8 ft. wide, with a short-pendulum, reciprocating motion providing 110 strokes per minute. A gate in the upper shakerscreen deck permits loading the entire product on the slack track as run-of-mine and also may be used for the disposal of mine cleanings. This arrangement, however, is purely an emergency measure and is not for regular use. When the gate is closed, which is the normal condition, the coal is passed over perforated plates on the upper screen to remove the slack, or minus 1-in. coal. This screen is of the stepped type, which causes tumbling of the coal and permits removal of adherent degradation that would otherwise ride over on the larger sizes. The screen is arranged so that the finer sizes come in contact with the screen plates before the larger, or lump, coal. Oversize from the upper screen is conveyed to the lower shaker. Nut, egg and lump sizes are prepared on the lower shaker and, by means of chutes, are fed onto the picking tables operating to the west, or at right angles to the main screens.

Slack Loaded on Shaker

Slack screenings from the upper shaker are loaded on a shaker conveyor working parallel to and in connection with the three picking tables. Gates in the shaker conveyor above the crushed coal and mixing conveyors permit the slack to be mixed with the larger sizes, or it can be loaded into railroad cars through a chute at the end of the conveyor. The nut coal travels over a flat ashboard stilt-type reciprocating picking table, so devised that the product passes the pickers in a thin, open bed. The egg and lump picking tables are similar to the nut table in size, construction and action.

Traveling directly below the center of the pickers is the house-coal and refuse conveyor. Refuse travels on the upper run of the conveyor to a bin at the south end of the building while the house coal travels on the lower run to a 20-ton bin at the north end of the screening plant. By an arrangement of vanes, the cleaned coal for local use is deflected from the picking tables through a chute and conveyed to the house-coal bin,

and the arrangement is such that the cleaned coal cannot be mixed with the refuse or reject.

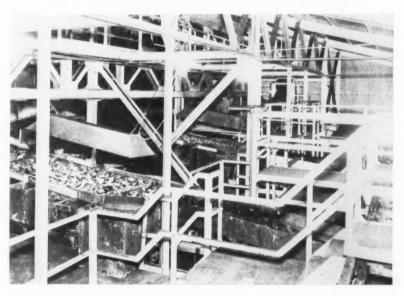
The picked coal may continue down the picking tables to either the crushed-coal conveyor or the mixing conveyor, or may be loaded directly into the railroad cars. The crushedcoal conveyor is a two-compartment unit constructed so that the entire product may be conveyed to a 36-in. single-roll crusher. But if it is desired to reduce only the larger sizes, this may be accomplished by bypassing the crusher with the smaller sizes and mixing them with the crushed coa! on the lower run of the conveyor. Just west of the crushed-coal conveyor is the mixing conveyor, which, as the name implies, is used for mixing various sizes of picked coal and delivering the product to the loading booms.

Passing directly under the crushedcoal and mixing conveyors are the hirged loading booms serving the lump, egg and nut tracks. These booms are of the pan type, and may be lowered to the floor of the car in starting and raised as loading progresses. An ingenious system for loading box cars with the products of the mixing and crushed-coal conveyors is to be located at the north end of the plant. The box cars will be filled by a box-car loader fed by a retractible reciprocating feeder conveyor.

Railroad cars are handled under the tipple by means of four car retarders with a small motor rewind manipulated by the control-booth operator. All mechanical equipment, exclusive of the dump station, is controlled by an operator located in a cabin with a clear view of the entire plant, as well as the loading operations on the railroad tracks. tipple man in the dumphouse will control the loaded-car feeder and the empty-car haul and trip maker. signal system has been installed to permit the central conrol operator to stop and start the different units as the necessity arises. The plant is completely motorized, with the exception of the mixing gates (handoperated), and has an estimated capacity of four to five thousand tons per day when working two 7-hour shifts. The Reliance tipple was designed by the Allen & Garcia Co. to meet coal-loading conditions set up by the Union Pacific Coal Co. management. It has shown its ability to perform up to expectations, although coal in sufficient quantity is not yet available for a complete capacity test.



New steel tipple serving the Reliance workings (looking east)



Showing egg and nut picking tables fed from main shaker screens at left

NOTES

From Across the Sea

WHEN a damp mine explodes, can the atmosphere and extinguish the explosion if the explosion be mild? Sir Henry Walker, chief inspector of mines of Great Britain, admits that he has had disquieting doubts. Notable for its studies into this phase of the subject is a report published recently by that authority which records the causes and circumstances attending a mild explosion but one causing a large number of fatalities at Wharncliffe Woodmoor Nos. 1, 2 and 3 colliery, Yorkshire, England, about 3.15 p.m., Aug. 6, 1936 (British Library of Information, New York, Cmd 5503; 42 pp., with three pocket charts; paper; price, 65c.).

In this explosion, 58 persons, all those present in the Northeast section of the mine No. 3, lost their lives. The Lidgett seam, in which the explosion occurred, is about 2 ft. 4 in. thick and about 942 ft. below the surface, and is reached by roadways from the Haigh Moor seam, which is about 102 ft. above the aforementioned seam. Only the four longwall faces of the Northeast section and the haulage roads leading thereto were affected. Coal was loaded by hand onto electrically driven conveyors, delivered by them to gate-end loaders similarly driven, discharged into cars and hauled by ropes from the workings.

According to the chief inspector, a pair of doors in No. 1 district, separating the intake airway from the return, had been wedged open by bricks so cars could be pushed past them without inconvenience. Apparently they had been open for some time, though for not more than three or four hours. After the explosion, which blew out all the other separating doors in the mine because they were closed, these doors were found open and uninjured.

While they were open and before the explosion, an electrician making repairs to the gate-end loader removed the cover of the commutator. The cover of the starting switch of the motor also was loose or was loosened. "After the explosion," declares the report, "the starting switch was found in the off position and the gate-end switch, being fitted with a no-voltage release and the current having been cut off at the surface of the mine shortly after the occurrence of the explosion, was, of course, also found 'off,' but the cable between these two switches had not been disconnected from either." As the explosion was mild and the starting-switch handle convenient, the electrician probably threw the latter after the explosion occurred.

Sir Henry was disposed to believe that this man had been running the gate-end loader to observe its condition or to clean the commutator, doing this in an atmosphere which was highly charged with methane because the ventilation doors were open. Electric lights were used for illumination, and safety lamps for testing; hence the report declares that the ignition

of methane was caused by sparks from the gate-end loader. This exploding methane stirred up and ignited the coal dust.

That methane was present is suggested, declares the chief inspector, because the deputy, who should have charged and fired the 23 or 24 holes drilled in the face, had not done so, though he had been there, as was evidenced after the explosion by the presence at that point of his flame safety lamp, shotfiring battery, explosives canister and stemmer. The chief inspector believes that the deputy, finding methane, decided to delay his operations, and that he was not materially delayed in the performance of this work, though he had leveled down a fall of rock which a deputy on an earlier shift had reported. This cave was not so severe as to interfere seriously with venti-The deputy was found dead with lation. other apparently fleeing men near the doors, the opening of which apparently caused the high percentage of explosive gas in the face. The origin of the explosion was generally placed by witnesses in No. 1 district.

So much for the details of the explosion, but the absorbing question is why the explosion traveled only the haulage roads, all but one of which were intakes, and failed to enter any of the returns, where the methane must have been in greater concentration. This shows that it must have been in the main a coal-dust explosion. Yet the mine was well rock-dusted (3.2 lb. per short ton of output) and the rock dust frequently sampled and renewed. Sir Henry, recalling similar conditions at the Haig pit, Whitehaven colliery, explosion, Jan. 29, 1931, believes that the explosion was able to spread along the haulage roads because moisture had bound the "limestone" dust so firmly that it could not rise and intermingle with the fine dust that lay upon it. After each of these explosions he had seen the "limestone" dust still white with a thick film of black dust lying upon it. By blowing on it the black film easily could be disturbed without dislodging the white inert dust beneath it.

Evidence of Dr. A. L. Godbert, of the Safety in Mines Research Board, indicated that coal from the Lidgett seam, if ground so fine that all of it would pass through a 100-mesh sieve (I.M.M. standard) and 80 per cent through a 200-mesh I.M.M. sieve, is so explosive that the mixture of coal dust and "limestone" dust when it contained only 35 per cent combustible matter would propagate flame in fresh air under standard conditions in the Buxton experimental gal-However, of the coal dust from 60 samples taken after the explosion, only 43 per cent—not 80 per cent—passed a 2 0-mesh sieve, the variation being from 10 to 80 per cent. With coal of this greater coarseness, 50 per cent would have to be present in the mixture for the latter to propagate flames in fresh air, which was the percentage which the management was

maintaining as its bogey. In fact, it rerock-dusted any parts of the mine where 50 per cent was nearly approached.

Sir Henry thought that, if the rock dust had risen satisfactorily, there was enough of it present to have prevented propagation. Dr. Godbert had found 35 per cent of combustible in the dust to be the ruling percentage throughout the mine, but he thought that 45 per cent should be regarded as the average value, for that would be the figure for the samples taken from the floor.

To show the failure of the dust to rise, Sir Henry said that 28 samples of the black dust had shown 40 per cent of combustible matter, whereas the rock dust below it contained only 9 per cent and the rest only 3 per cent. Some rock dust was raised by the explosion, for the carbon dioxide in the dust taken from the car tops ran 11 per cent, showing that 25 per cent of limestone was present.

For rock-dusting, a magnesium-carbonate limestone was used containing 54.5 per cent of calcium carbonate and 40.6 per cent of magnesium carbonate, yielding, when acidified, 45.5 per cent of carbon dioxide. Combustible matter was negligible. Moisture, size analyses (I.M.M.) and velocities of air in feet per minute at which particles in a tray, 3x3 in. square and ½ in. deep, flush with the floor of a wooden gallery, will begin to move are as in the accompanying table.

MOISTURE, SIZE ANALYSES AND DISPERSABILITY
OF INCOMBUSTIBLE DUST

	Moisture per cent	Minus 50-mesh	Minus 100- mesh	Minus 200- mesh	Dispersa- bility, ft. per minute
St pply-hou	86				
sample	0.1	100	97	81	3,300
	Sam	ples Fron	Bags in	Mine	
No. 1	0.4	100	99	89	3.400
No. 2		100	99	82	3,300
No. 3	0.4	100	99	88	3,300
No. 4		100	99	87	3,400
No. 5		100	99	87	3,500
No. 6		100	98	86	3,400
Steatley lin				82	4.300
Buxton lim				57	4,300
Shale				80	3,600
Fullers eart	h			50	3,100

From this it will be noted that the magnesium limestone was an active dust as compared with all but fullers earth. (Incidentally, it might be suggested that magnesium limestone is likely to release carbon dioxide at a lower temperature than calcium carbonate and thus lower flame temperature, though some might say scarcely in such a feeble explosion; on the other hand, it might possibly bind the dust or aid combustion catalytically. The last possibilities no one seems to have determined. Alabama operators, from inquiry, appear to look with favor on dolomite dust.)

Exposed for two days at a temperature of 68 deg. F. to air of 95 per cent humidity, the dust that rose at 3,300 ft. per minute waited for a gust of 3,700 ft. per minute before rising. The mine dusts that rose for air speeds of 3,300 to 3,500 ft. per minute after this treatment did not bestir themselves until the velocity rose to 3,700 to 4,200 ft. per minute.

Rock dust at this mine was always sprinkled by hand, so another test was devised in which the dusts were dropped in the tray from a height of 3 ft.; the minimum speed to raise such dusts was 3,600 ft. per minute. The reader will ask: What if such dusts had been well trampled underfoot, or cemented by mine solutions, as

much of the floor dust in the mine usually

"I think," asserted Dr. Henry Walker, "that whilst limestone dust may be an effective dust to use in deep and hot mines, it is not one which is suitable for use in comparatively shallow mines, which, especially during the summer months, are apt to be damp. Also I think stone dust would be more effective if it were blown into the air currents by means of compressed air, from tubs or bunkers placed at the sides of the roads rather than being spread by hand.

One cannot feel that the experiment of Dr. Godbert really developed the true indispersability of floor dusts exposed to mining conditions or stressed enough their variance from experimental mine observations. In some mines reliance may have to be placed on rib and roof dust, neither of which is free from moisture or solutions. Trays of dust in crosscuts might aid and not add greatly to air resistance.

Twenty-five men were burned and two killed outright by violence, but for the most part the men were killed by carbon-monoxide poisoning. What would have happened had the men been equipped with selfrescuers? Perhaps a large percentage would have been saved. To all appearances, many had traveled some distance after the explosion.

1. Davis Hall

find a new method of approximate calculation that will save him much trouble and protect him against provoking errors.

Modulus of elasticity based on the value of the secant of a line drawn from the origin of coordinates to the point of half the ultimate stress of the specimen showed 235,000 lb. per square inch for No. 5 block to 615,000 lb. per square inch for the Sewickley bed, both taken on bed, and 93,000 for one sample of the first coal (593,000 for another sample) and 800,000 for Waynesburg upper bench along bedding planes. The low and high figures mark the extremes in each case of a host of samples from 25 beds.

Manuel de la Cokerie Moderne, Vol. I, by M. Simonovitch. Published by H. Vaillant-Garmanne, S. A., Liége, Belgium. 750 pp., 71 x 11 in.; cloth. Price. \$24.93 (740 belga francs).

This book, based on "Handbuch der Kokerei" and "International Handbook of the By-Product Coke Industry," of the recently deceased Wilhelm Gluud (research director, Ruhr Collieries, of Germany, and one-time assistant of Emil Fischer) and his collaborators, covers a general study of coal and refractories, coal preparation, briquet manufacture, coke ovens, use of lean gas in heating ovens, mechanical equipment for ovens, cooling of coke and plant descriptions. Its references to Coalite and Carbolux in the section on dry distillation of coal does not cover in any great detail the studies made in low-temperature carbonization. A few pages are devoted to oil flotation. A scholarly book, it will be read with interest by those who understand French.

Electric Cap Lamps in Alabama Mines, 1935, by F. E. Cash, U. S. Bureau of Mines. Information Circular No. 6865;

Electric lamps were introduced in Alabama in 1916, but the first complete installation in that State was made by the Gulf States Steel Co. at its Virginia mine, July 1, 1918. At the date of Mr. Cash's report, 10,842 electric cap lamps were in use, with seventeen companies having complete in-stallations. Electric safety mule lamps were first used by the Alabama Fuel & Iron Co. in December, 1931. Now, 198 such lamps are used, saving lives of mules, speeding transportation and possibly reducing accidents to men. About 54.9 per cent of the Alabama production is mined with the aid of these electric lamps.

Several ways in which these lamps have been made less safe and less effective are described by the author. He advocates attractive lamp houses, for, when they are cleanly and neatly maintained, miners are inspired to use their lamps with proper In some places, prizes for exceptionally good care of lamps will help; in others, a system of charging all breakage of lamps against the individual is likely to be more effective. Improvements in design are not impossible, says the author, but they should not be made by the coal company or inventor but through the manufacturer, who undoubtedly will welcome suggestions

for improvement.

On the

ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U.S. Bureau of Mines, application should be directed to that Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

Alignment Charts, Their Construction and author of the introduction to this circular, Use, by Paul N. Lehoczky. Ohio State University Studies, Engineering Series. Circular No. 34, 62 pp., 6x9 in., with pocket chart; paper. Price, 40c.

For those not acquainted with the device, an alignment chart primarily may be described as one in which a dependent value can be obtained by drawing a straight line connecting the independent values to intersect a line on which the dependent variables are plotted. Complications come when there are more than two independent values, but the lines drawn are always straight, though one may pivot from another.

One cannot agree with J. M. Weed, the

that the word "alignment" is not expressive. These charts are sometimes termed "nomo-grams," as they accord with the law which connects the independent variables to the dependent variable. Mining engineers have not used them as often as they should; in general, they have adopted them only to determine the more simple relations.

Alignment charts can be divided into three types: (1) for addition and subtraction, (2) for multiplication and division, (3) combinations of (1) and (2). Powers (exponents), with or without added and subtracted values, fall under the last two groups. After a study of this book and the construction in accord therewith of suitable alignment charts, the engineer may

STRENGTH OF COAL IN COMPRESSION

Locality Authority	Date of Report	Kind of Coal	Size of Sample	Orientation	
Germany O. Mueller	1930	anthracite (?)			484 to 2,987
England H. Louis	1904–5		3- and 4-in. cubes	on bed along bed	560 to 6,362 694 to 3,808
India E. Penman	1931		various		1,000 to 4,600
$P_{a} \dots \{I. D. Moor\}$	e 1907	anthracite	$\begin{cases} 2-in. \text{ cubes to} \\ 4x4x12-in. \text{ columns} \end{cases}$		831 to 3,870
U. S J. Daniels L. D. Moor	e} 1907	bituminous	various		700 to 1,538
Pa Scranton neers' Ch	Engi- ab 1912	anthracite	2-in. cubes		1,744 to 7,009
Ill. Gool, St	arv. 1907	bituminous	11-to 15-in. cubes 2½- to 4-in. cubes 7- to 8-in. cubes 10- to 12-in. cubes		1,000 to 2,170 2,486 av. 2,170 av. 2,008 av.
U.S Bureau of N	lines 1930	Pittsburgh bed	12x12x18-in. high 30-in. cubes (roughly 54-in. cubes (roughly 4x4-in. area larger areas)	1,152 av. 817 av. 306 av. 14,000-15,000 4,500 min.
W. Va C. E. Lawal	$\binom{11}{nd}$ 1937	Bituminous	3-in. cubes	on bed	1,432 (Pocahon tas No. 3) to 6,861 (Coal- burg) 823 (Pocahontas No. 3) to 5,009 (Stockton and
Where no etatement in				1 1 4 4	Winifrede)

here no statement is made, the pressure was almost certainly made at right angles to the bedding of the or "on bed."



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"Experience justified us in standardizing exclusively on Exide-Irondad Batteries"

"The three Batteries in our No. 21 mine are respectively 6, 7, and 8 years old"



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that had given us approximately six years
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"The battery locomotive has every advantage in mechanized mining, and one of the reasons is the performance of Exide-Ironclad Batteries"

EPORTS such as these are typical of those received from mine operators. More and more their comments deal with the advantages of the storage battery locomotive in mechanized mining, and with the way the Exide-Ironclad Battery meets these special requirements. It has proved itself ideal for the fast switching service that is needed if loading machines are to function most efficiently.

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OPERATING IDEAS

From Production, Electrical and Mechanical Men

Electric Welding Facilitates Cutter Maintenance

Welding finds its place in both new construction and maintenance around coalmining operations. On the maintenance side, A. F. Davis, vice-president, Lincoln Electric Co., Cleveland, Ohio, offers examples of the use of electric welding in making repairs and building up parts for cutting machines at a Pennsylvania mine. Fig. 1 shows a ring gear employed for swinging the cutter bar on a trackmounted machine. Several teeth were broken out of this gear, which would have involved scrapping it in the old days. Instead, new teeth (indicated by the chalk mark) were installed by the welding department. This was done by building the ring up to the right height with "Fleetweld 7" electrode and then machin-



Fig. 1—Broken teeth in this ring gear were replaced by electric welding



Fig. 2—Left, lengthening clutch teeth by welding; center, showing lugs on bevel gear built up by welding when they become worn; right, clutch surfacing by electric welding

ing the teeth to the proper size and case-hardening them.

Another example of welding versatility was in lengthening the teeth on a cutting-machine clutch. When an attempt was made to install this new part, the teeth were found to be too short. In lengthening them, hard-wearing material was applied to the edges with abrasion-resisting "ABrasoweld" electrode, as indicated at the left in Fig. 2. On the right in the same figure is another type of clutch, which is surfaced with "Fleetweld 7" mild-steel electrode supplemented by case-hardening. In the center in Fig. 2 is a bronze bevel gear for a cutting machine. Whenever the lugs in the inside become worn, they are built up with "Fleetweld 7" and then case-hardened.

Underground Dump Modified To Reduce Dust Output

Modification of the underground dumping station and installation of special handling equipment have eliminated the dust problem growing out of dumping on the second level at the Potts Colliery of the Philadelphia & Reading Coal & Iron Co., Locustdale, Pa. All coal from this level is brought to a single dump in mine cars and is discharged into a bin with two hoppers. Capacity of each hopper is equivalent to two cars. A vertical flygate diverts the coal either to the right or the left hopper, as desired, from which gunboats operating on the main slope are filled alternately.

The main air current for the operation enters through this main slope and formerly traveled along the landing, blowing dust from the dumped coal into the faces of the dumpmen. Though this dust, being anthracite, is not explosive, the resultant low visibility and uncomfortable conditions were most annoying. To remedy the condition, a hood was placed over the dump to prevent, as far as possible, the entrance of air. And, to close the passage more completely, double doors were erected across the gangway through which the air formerly traveled. At the same time, arrangements were made to provide another path around the dump for the air. For this, another gangway was available.

Diversion of the intake air did not remove the dust but permitted it to remain in the hoppers, from which some dust still

would enter the landing. To provide for the removal of the dust, two ducts were inserted through the back of the hood, with their intake ends turned downward toward the bottom of the coal bin. These ducts converge into one, which in turn leads into the intake airway, through which air is drawn by a 21-ft, exhaust fan located on the surface. The suction thus created is sufficient in most cases to draw the dust from the front of the hood through the ducts into the airway. However, to insure removal when the doors are opened to permit passage of car trips or when exceptionally dusty coal is dumped, an air jet, with its nozzle directed toward the exhaust end, has been inserted in each duct. Compressed air, however, is used only in exceptional cases. This combina-tion has removed all difficulties, and the air in the tunnel and gangway back of the dump now is as clear as elsewhere in

Brush Between Cap and Shaft Ended Bearing Trouble

Excessive wear of motor bearings due to current generated because of some peculiarity of design was encountered in several of the early applications of large induction motors to hoists and other mining equip-

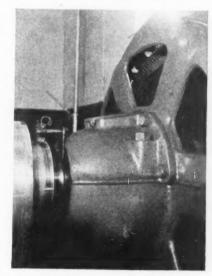


Fig. 1—Brushes were applied to both ends of the motor shaft

ment. This same difficulty, but not proved as being from the same cause, showed up recently in a new installation of a 700-hp. hoist at the Glen White (W. Va.) mine of the Koppers Coal Co. and was cleared up by the use of current-collector brushes riding on shafts to form low resistance paths from shafts to frames. Fig. 1 shows a brush connected to the motor-bearing cap and riding on the shaft coupling. Fig. 2 shows a brush riding on the hoist drum shaft.

The hoist was purchased new to replace a steam hoist but the 700-hp. motor had

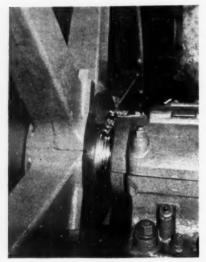


Fig. 2—As an additional precaution a brush was applied to the drum shaft

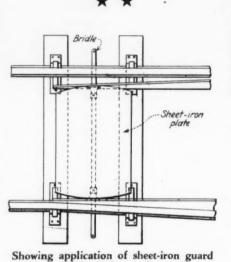
seen previous duty and is not of recent design. The exact cause of the current was not determined. In the opinion of the division electrical engineer the flow was a direct-current stray from the underground power system. The motor bearings failed first and then a bearing on the jack shaft gave difficulty. No indication of deterioration of the drum-shaft bearings appeared but the brush was applied thereto as an additional precaution.

Sheet-Iron Plate Guards Switches

To reduce the possibility of men catching their feet and also to keep coal, dirt and sand from under switch bridles, Walter Iman, Kitzmiller, Md., offers the guarding system shown in the accompanying sketch. The guard consists of a piece of sheet iron wide enough to span the space between the ties on either side of the bridle, with sufficient overlap on the sides to cover part of both ties. Length of the guard is such that it will reach from one switch point to another, as shown. The guard is held in place by the bridle bolts and rests on top of the ties. A piece of board can be nailed over the ties outside the rail on either side of the track, leaving as the only entrance for foreign material the span between the switch point and rail when

Swing It!

• "Swing it!" lately has become a signal for musical gyrations, but it also has a much older significance. For years when a man tackled a new job or a new problem, the question most often asked was "Can he swing it?" In swinging it, a store of knowledge gained from all possible sources is a big help. This department is designed to supply selected bits of such knowledge to operating, electrical, mechanical and safety men at the mines. Here are presented solutions to the many problems that come up from day to day. So if you have licked one, tell us how you did it. Include a sketch or photograph if it will help to make the explanation clearer. For each acceptable idea, Coal Age will pay \$5 or more.



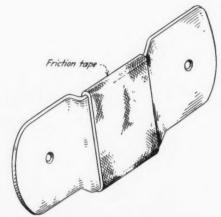
the switch is open. On the outside, the guard here described also is useful in keeping snow out of the space occupied by

to track switch

the bridle.

Lamp Clips Tightened With Friction Tape

When clips for holding electric cap lamps on hats become loose, Charles W. Watkins, Kingston, Pa., recommends wrapping them with friction tape as indicated in the accompanying sketch. A piece of tape 4 to 6 in. long is wrapped around the clip so as to keep the ends on the inside. Then the tape is pressed out with the fingers and the clip is forced downward until a sufficiently tight fit is assured. While placing the lamp in or taking it out

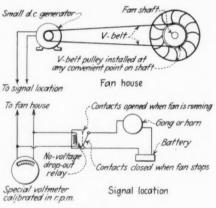


Showing application of friction tape to electric cap-lamp clip

of the clip is easy, says Mr. Watkins, the friction of the tape holds it securely in place in service.

Visual and Audible Signals Indicate Fan Operation

"The 1937 amendment to the Pennsylvania State mine law states that an attendant shall be kept on duty constantly at all principal ventilating fans while men are in the mine unless a visual signal indicating the revolutions of the fan, as well as an audible signal announcing stoppage



Details of fan signal system

of the fan, are placed at some point where they will be constantly under the observation of a reliable person," writes F. F. MacWilliams, Flood City Brass & Electric Co., Johnstown, Pa. "The accompanying sketch shows an economical and practical method of complying with the law.

"The driving pulley shown may be installed at any point on the fan shaft. Ordinarily, we bolt it onto the center of whichever end is most convenient. Any small d.c. motor may be used as a generator of driven slightly above its speed as a motor. The voltage generated will bear a definite relation to the speed so that a voltmeter may be calibrated in r.p.m. instead of



because his Eyes were not Guarded by GOGGLES

Looking at it with a Human Eye: Who wants any part of the responsibility for causing needless suffering . . . perhaps inflicting a life-long handicap . . . or even depriving an entire family of its only sure means of livelihood?

Looking at it with a Business Eye: Who wants any part of the responsibility of "selling his company short" . . . by contributing even unknowingly to higher cost-per-ton? Yet as long as eyes are left unguarded at hazardous work or anywhere near it, the company is being let in for a loss. In compensation. In lost time and unmined coal. In medical, clerical, administrative costs. Plus hidden costs — like sunken morale — that can't be measured or audited.

Looking at it with Both Eyes: The only human, businesslike thing to do is put all eyes safely behind goggles. It's an economical move, for seldom does a dollar go so far to wipe out a potential liability. And it's quickly done . . . just tell your MSA representative to survey your operations and submit a plan for complete American eye-protection.



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REPRESENTED IN THE MINE INDUSTRY BY MINE SAFETY

volts. Ordinarily, where the fan is run at several speeds, this calibration is made by actual runs after the equipment is installed, so that the readings are absolutely correct.

"Any small drop-out contactor may be used, as when the fan is not running no voltage is induced. Also, the signal may be any audible indicator which seems most suitable, preferably, however, operated by a battery to give a positive source of power. The above scheme has the advantage that in the event of any possible failure of fan operation, as well as any line or generator fault, the r.p.m. meter will drop to zero and the audible signal will be set off. Also, only two wires need be run from the fan house to the signal location."

New Refuse-Disposal System Uses Old Trailer Car

Lower operating cost and more effective use of adjacent dumping space have been attained by a refuse-disposal arrangement adopted at Nellis mine, Boone County, West Virginia, to replace the original arrangement of steam locomotives and trailer dump car. Locomotives were dispensed with while the car was utilized in an unusual application for a car of its type.

This car, purchased in 1925, is a 10cu.yd. three-way-dumping, air-operated Difterential trailer unit. When hauled by



Here the 10-cu.yd. three-way dumping trailer is at the top of the incline and the operator is about to start the dumping mechanism. The hoist house on the mountainside is indicated by the arrow

steam, a rod locomotive first was used, followed by a geared locomotive, but the grade limitations resulted in rapid filling of the available dumping space in the valley adjacent to the tipple and preparation plant. With the new arrangement, as indicated by the schematic drawing, a hoist was installed on the mountainside 3,000 ft. from the plant and 500 ft. higher in elevation. At its highest point the refuse pile being formed by the incline will be 200 ft. above the top of the original fill.

To the three-way dump car was added a tank for storing air to effect the dumping and operate the air brakes, which are available to the car rider as an emergency means of stopping if the hoist rope should break. This tank is charged with compressed air from a stationary unit while the car is being loaded under the refuse

Material dumped per shift totals 360 tons, and of that amount 250 tons is tipple and washer refuse and 110 tons is mine refuse (principally drawslate). Coal shipped from the mine averages 1,200 tons per shift (two shifts per day) and of the raw-coal output 18 per cent by weight is discarded in the preparation process. Excepting a small tonnage hand-loaded onto chain conveyors, the mine is operated with mobile loading machines. A hard bone parting 2\(^x\) in thick contributes in a large measure to the bulk of waste material loaded with the coal.

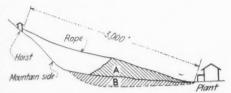
Four men constitute a refuse-handling crew and the work is carried on during both shifts. One man operates the hoist, another rides and operates the three-way dumping car, while the other two make the track extensions on the fill and also handle the mine-car dumping at the tipple, which is done directly into the refuse-storage bin.



Effecting an end dump using cylinderstored air. Several years will be required to fill to the hoist house (arrow). Then the dumping line will be deflected by installing sheaves on the mountainside



The three-way trailer with its own airstorage cylinder builds a fairly wide refuse pile at Nellis



B indicates refuse piled by steam locomotive and trailer. A indicates the refuse pile being formed by rope and trail car



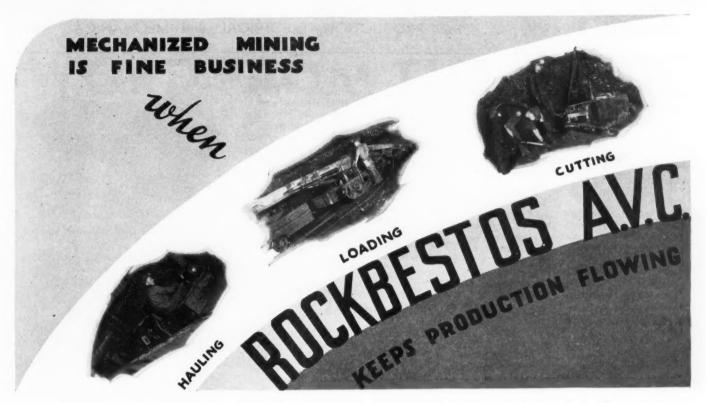
While refuse is loaded, the air tank is charged through a hose to a stationary compressor and receiver

A single-drum hoist pulls the refuse car up the incline (600 f.p.m.). It is driven by a 150-hp. motor. Rope size is 1 in. and rope life is approximately one year. The mine is operated by the Nellis Coal Corporation, a subsidiary of the American Rolling Mill Co.

Making Threads Work Easily In Dusty Locations

Threads on various types of equipment become more or less clogged with dirt on occasions, writes John E. Hyler, Peoria, Ill., with the result that the nuts work stiffly. The finer the threads, the more likely this difficulty is to be encountered. It can be overcome by filing a groove across the threads as deep as the roots on either the bolt or the nut, or both, as desired. In action, the grooves tap out the dirt embedded in the threads each time the nut is run on or off. The dirt, of course, is collected in the grooves.

In addition to the self-cleaning action, cross-grooved threads also are self-corrective to a considerable extent in the event the threads become slightly battered or otherwise damaged. A badly battered thread sometimes may be restored when no tap or die is available by grooving it and using valve-grinding compound or some similar fine abrasive. The worst part of the obstructions in the threads on the male member may be removed with a file, after which grinding compound is



You know how important it is to keep modern mining machinery functioning smoothly. You know how troubles pile up on each other when cutters, loaders or locomotives break down and interrupt the normal flow of coal from face to tipple. And you know that every possible precaution must be taken to prevent delays or outages of any kind.

One very effective precaution is the use of Rockbestos A.V.C. Mining Cable for motor, resistor, and controller connections. Designed especially for use in electrically operated mining machinery, it can't burn or transmit flame and is highly resistant to heat, moisture, oil, grease, and coal dust. Used in locomotives, loaders, mining machines, etc., it practically eliminates short-circuits and other electrical troubles caused by ordinary insulation drying out and breaking down.

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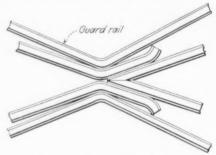
In England-British Insulated Cables, Ltd., Prescot, Lancashire.

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smeared on and the nut is run back and forth until the abrasive action restores the proper clearance.

Guards Stop Derailments At Track Frogs

Guard rails to be installed alongside frogs instead of at the opposite side of the track are proposed by Walter Iman, Kitzmiller, Md., as a means of reducing derailments. The method of installation is indicated in the accompanying diagrammatic sketch. The ball of the guard rail should be set just close enough to allow the outside of the car wheel to touch when the flange of the wheel just clears the frog point. Top of the guard-rail ball should be about § in. higher than the top



Indicating diagrammatically how guard rails are placed

of the regular track rails and frog. Length of the guard rails, which are bolted in place, can be varied to suit conditions. If securely installed, the rails also will serve as rerailers. With this type of guard rail, declares Mr. Iman, loose or worn wheels, or badly worn, out of line or low frog points will not result in derailments.

Plastic Wood Facilitates Electrical Repair Work

"In my work as an electrician at the Banner Coal Mining Co., Osceola Mills, Pa.," writes Samuel McKay, Jr., "I have had to do a great deal of repairing of reverse drums, switches, brush holders, finger boards and similar equipment. Most of this work had to be done in a day or less, and as a result I have found that a can of plastic wood is a necessity to any repairman. With plastic wood I have repaired a great number of wooden finger boards and reverse drums from locomotives, cutting machines and other mine equipment after they had been burned by reversing.

"Plastic wood is not very hard to use if the directions on the can are followed." The part must be cleaned and roughened by removing all dirt, paint, oil or grease, and all charred wood, and then gouging out the place with a knife or gouge until a shallow hole is formed where the burned wood originally was. After cleaning and roughening, the hole or flat place is filled with plastic wood, using a knife and building the plastic wood up a little higher than

the surrounding wood to allow for shrinkage. Then the patch should be allowed to dry for twelve hours or more, depending upon the thickness. If a thick patch is necessary, it should be built up in thin layers, permitting each layer to dry and sandpapering it before applying the next.

Plastic wood, as can be seen from the above, is used like putty. But when dry it is as hard as wood and, in addition to taking screws and nails, can be cut, sawed, sandpapered, painted, etc. "I always have a can at home and at work for any needed repairs on wood, slate or fiber," Mr. Mc-Kay concludes.

Mine-Car Maintenance Aided By Electric Welding

Keeping mine cars in condition is a substantial item in maintenance cost, declares A. F. Davis, vice-president, Lincoln Electric Co., Cleveland, Ohio, in offering a number of examples of electric welding in this field. Fig. 4, for example, shows a number of mine cars in which the bottoms are fabricated by welding, supplemented by the use of the electric arc for assembling supplementary parts, at a mine in Pennsylvania. Such bottom fabrication requires merely the cutting of standard steel plates and shapes to correct size and then fusing them together electrically into a single unit. The weight saving is nearly 150 lb. per bottom, and the inside presents a smooth surface offering minimum resistance to the coal in dumping. This type of bottom also permits the use of a kneeaction bearing on the axle.





Fig. 1—Mine-car axle after rebuilding with the electric arc



Fig. 2-Welded steel mine-car bumper



Fig. 3—Band brake with wooden brake blocks (left), compared with same-type brake with welded-steel braking elements (right). In the center is a brake shoe fabricated from mild-steel plate

are rebuilt as shown in Fig. 1 for a total cost of 89c., including labor, power, machining and material, using the electric arc. Fig. 2 shows a welded-steel mine-car bumper, in which is inserted a welded coupler. With electric welding, this unit is fabricated for \$11.52. In Fig. 3 (right) is shown a band-type mine-car brake with steel braking elements welded to the strap. This compares with the previous practice of using wood inserts as in the case of the brake on the left in Fig. 3. Steel-brake assemblies are made for a total cost of 75c., including labor and material. In the center in Fig. 3 is a mine-car brake shoe costing only 35c. This shoe is made by welding pieces of mild-steel plate together with the electric arc.



Fig. 4—Fabricating mine cars with the electric arc, showing use of weldedsteel bottoms

WORD FROM THE FIELD

Engineers' Meeting Climaxes Anthracite Week

Anthracite Week, with its activities in behalf of the hard-coal industry, was brought to a fitting close with a joint engineers' meeting on Oct. 9 at Scranton, Pa. Among the four hundred in attendance were officials and engineers of coal-mining companies, utilities and manufacturing plants as well as teachers from educational institutions in the Lehigh Valley.

The program included the following papers: "The Future of Anthracite," F. W. Earnest, president, Anthracite Industries, Inc.; "Looking Ahead in Anthracite From the Operating Department," Cadwallader Evans, Jr., vice-president and general manager, Hudson Coal Co.; "Operating Electrical Power Systems on an Interconnected and Coordinated Basis," Philip Sporn, vice-president and chief engineer, American Gas & Electric Co. The meeting was sponsored by the local sections of the American Institute of Mining and Metallurgical Engineers, American Institute of Electrical Engineers, American Society of Mechanical Engineers and the chambers of commerce in the anthracite region.

W. H. Lesser, electrical and mechanical engineer, Pierce Management, was in charge of the committee on arrangements.



A temporary field office has been established by the U. S. Bureau of Mines at the Colorado School of Mines, Golden, Colo., as part of an experimental undertaking in connection with the utilization of lignite and bituminous coals of the West. V. F. Pary, Sr., fuel technologist, Coal Division, Bureau of Mines is in charge of the work, and O. S. Bowman, of Colorado Springs, has been retained as consultant.

The investigation is being financed by a congressional appropriation of \$100,000 for a three-year study of lignite and sub-bituminous coals, the object being to develop a practical carbonization method for processing low-rank fuels to improve their utilization. A temporary field statio, will be organized to study coal deposits of Colorado, North Dakota, Montana and Texas.

Indict Harlan Operators

Trials of Harlan County (Kentucky) operators and law enforcement officers, charged in 69 indictments with violating the Wagner Labor Relations Act in conspiring to deprive miners of civil rights, have been set for Feb. 1, 1938. When the defendants appeared in federal district court at Lexitation on Oct. 4 before Judge H. Church Ford they have bonds aggregating \$180,000, and the court decided that the trials should



be held at Jackson, the nearest federal court to the Harlan field.

The indictments, returned at Frankfort on Sept. 27, named 22 coal mining companies, 24 mine executives and 23 lawenforcement officers or former deputies of Harlan County. The last-named group was headed by Sheriff Theodore Middleton and Deputy Sheriff Ben Unthank, chief targets of criticism during the hearing by the LaFollette Civil Liberties Committee of the U. S. Senate at Washington.

Keeping Step With Coal Demand

Bituminous Production

		1937	1936*
Week Ended	(1,000)	Tons)	(1,000 Tons)
September 4		8,439	8,279
September 11		7.712	7.874
September 18		9.067	8.587
September 25		9.450	8,794
October 2		9,630	
Total to Oct. 2		336.705	310,590
Month of August		33.984	
Month of Septemb	ber	38,626	

Anthracite Production

September 4	830	738
September 11	589	742
September 18	743	869
September 25	878	1,009
October 2	1,078	1,297
Total to Oct. 2	36,442	40,871
Month of August	2,593	3,503
Month of September	3,596	3,874

*Outputs of these two columns are for the weeks corresponding to those in 1937, although these weeks do not necessarily end on the same dates.

Bituminous Coal Stocks

(Th	ousand	s of Ne	t Tons)
		Aug. 1 1937	
Electric power utilities. Byproduct coke ovens		8,523	5,744 5.982
Steel and rolling mills Railroads (Class 1)	$\frac{1,388}{7,194}$	$\frac{1,485}{7,195}$	$947 \\ 4.304$
Other industrials*1		12,355	8,194
Total3	7,071	35,991	25,171

Bituminous Coal Consumption

Bituminous	Coal	Const	ımptio	n
		ousand August 1937		t Tons) August 1936
Electric power util Byproduct coke ov Steel and rolling m Beehive coke oven Railroads (Class of Other industrials*	rens nills s 1)	6,492 $1,085$ 499 $6,726$	3,843 $6,281$ $1,042$ 450 $6,759$ $9,420$	3,662 $5,548$ $1,037$ 205 $6,546$ $8,429$
Total		28,167	27,795	25,427

* Includes coal-gas retorts and cement mills.

State Control of Anthracite Urged by Commission

State regulation of the hard-coal industry by a State authority was recommended by the Anthracite Coal Industry Commission as a solution of the industry's difficulties at a meeting of representatives of the operators and miners held Oct. 15 in Philadelphia, Pa. The Commission declared that it had decided that regulation through a proposed special authority was "the most practical approach" to the problems of bootleg mining and the loss of anthracite markets. It reaffirmed, however, its opinion that "the ultimate solution of the anthracite problem is State ownership and operation," but added "this appears impracticable, however, as a basis for any constructive action at present."

Presented at a gathering which was an outgrowth of a conference of Governor Earle's committee of nine (see page 86) held on the preceding day, the plan has these objectives:

1. To regulate costs and prices at the mine.

2. Establish production quotas by districts and mines on the basis of a number of factors, including cost of production, unemployment, community needs and marketing methods.

3. Give the Commission power to examine books, establish uniform accounting, etc.

4. Take over State bureaus and functions as to anthracite.

5. Be authorized to establish public corporations for the production and distribution of hard coal for the purpose of reemploying miners now working in bootleg mines and other areas.

 Have power to establish cooperative marketing and non-profit promotion agencies to extend demand for anthracite and reduce distribution costs.

7. To represent the entire industry in matters of common interest, such as negotiations concerning freight rates, etc.

Report on Finances Issued

The financial condition and operations of anthracite companies of Pennsylvania are covered in a report by the Anthracite Coal Industry Commission made public on Oct. 5 by W. Jett Lauck, chairman of the commission and prepared under the direction of C. V. Maudlin, head of the Bureau of Applied Economics, Washington, D. C. The book value of the anthracite deposits and culm banks, less depletion, of the ten principal old-line companies, according to the report, was \$193,912,423 as of Dec. 31, 1936, and their property and equipment, less depreciation, was valued at \$107,500,709. On the same date "independent" producing companies owned deposits and culm banks valued at \$16,833,409; estates, individuals and non-producing companies had holdings of deposits and culm banks valued at \$39,332,588; and producing companies not affiliated with railroad interests, and non-



Dr. F. C. Honnold

producing companies had other property and equipment valued at \$49,878,987.

From these figures it is computed that the total value of deposits and culm banks, less depletion, was \$250,078,420 and the value of other property and equipment, less depreciation, was \$157,379,696, making a total of \$407,458,116. In compiling these figures an effort was made to eliminate all property or equipment which was not used or useful in the production and preparation of anthracite.

A study of the composite balance sheets of companies producing 85 to 90 per cent of the total tonnage during 1926–32 and 90 to 95 per cent during 1933–35, says the report shows that the ratio of current assets to current liabilities declined from 2.86 to 1 as of Dec. 31, 1926, to 1.14 to 1 as of Dec. 31, 1935. The ratio of cash and marketable securities to wages and accounts payable decreased from 1.92 to 1 to 0.52 to 1 in the same period.

A composite financial statement of these companies, continues the report, shows a decrease in working capital from \$111,097,-223 on Dec. 31, 1926, to \$8,860,217 on Dec. 31, 1935. On Dec. 31, 1934, the companies had bonded indebtedness and mortgages amounting to \$210,538,000; on the same date they had securities and other investments totaling \$163,289,000, which was approximately 25 per cent of their total assets and over 45 per cent as much as they had in capital assets. During 1934 the companies received interest and dividends of \$3,318,000 on their investments, or an annual rate of slightly over 2 per cent. During the same year they paid out \$10,905,-000 as interest on bonded indebtedness and mortgages, or an average rate of 5.2 per The difference between the 5.2 per cent paid out and the 2 per cent received, the report points out, is approximately \$5,-200,000 annually, which amount "would have been saved by the anthracite industry as a whole under a policy of confining its operations to the mining and preparation of

"There seems to have been very little effort made in the past by the various anthracite companies to establish rates for depletion and depreciation which accurately reflected the amounts properly chargeable," declares the report. In some cases, it is alleged, depletion rates have been so high that the actual value of the deposits was

completely amortized and charged to operating costs long before the anthracite was exhausted, and substantial write-ups were made in the value of the remaining deposits.

"The average depletion charge during 1935 on fresh-mined anthracite, based on amounts charged by 42 companies, as reported through the Anthracite Institute, was 14.2c. per net ton when adjusted so as to include only the amount produced from lands and deposits owned in fee. This amount is 2\frac{3}{2} times the average value of 5.17c. per ton of recoverable anthracite, based on the owners' estimates of tonnage value, and five times the average value of 2.74c., based on estimates of federal authorities as to tonnage and the book values as given by the owners."

Analysis of reserve accounts of the companies, says the report, indicates a tendency to set up reserves in excess of actual needs.

"During the ten-year period ending Dec. 31, 1935, the net income available for dividends and surplus of companies producing 85 to 90 per cent of the total anthracite tonnage during the period averaged \$6,894,694 per annum. During the same period the capital stock outstanding averaged \$170,-123,157, so that the net return available for dividends and surplus was 4.05 per cent."

S. P. Howell Passes

Spencer P. Howell, 57, senior explosives engineer in the U. S. Bureau of Mines, died suddenly Sept. 25 at Virginia Beach, Va. Graduated from Lombard College, Galesburg, Ill., in 1904, he subsequently did postgraduate work in Washington University, St. Louis, Mo. From May through June, 1908, he was a member of the staff of the U. S. Geological Survey, successively at St. Louis, Norfolk, Va., and Washington, D. C. Then he was assigned to the physical testing of explosives, which was then being organized by the Survey at Pittsburgh, Pa. This work was transferred to the U. S. Bureau of Mines on its creation in July, 1910, and he was a member of the staff of that Bureau from the transfer until his death. He was closely connected with development of the test methods which led to establishment of standards of safety and the Bureau's list of "permissible" explosives. In 1911 as a



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A. L. Allais

part of this work he investigated the methods of testing commercial explosives in England, France, Belgium and Germany. For nearly three years, beginning in 1920, he conducted investigations of the use of explosives in mines of the Southwest and West with headquarters in Tucson, Ariz. Then for a year he was assistant to the chief of the Bureau's Explosives Division, with headquarters at Washington. Since 1927 his work had been with the Safety Division of the Bureau with headquarters at Pittsburgh.

Dr. F. C. Honnold Is Dead

Dr. Fred C. Honnold, 65, well known in the coal industry of Illinois, died Oct. 14 in Glencoe, Ill., following a heart attack. Born in Maryville, Mo., he was educated at Denver University and Rush Medical College. After practicing medicine for ten years he became identified with the coal industry in 1905. From, 1923 to 1928 he conducted the Honnold Coal Bureau in Chicago, a statistical organization which afterward became the Illinois Coal Bureau, and he was secretary-treasurer of the latter from 1920 to 1930, when he retired. He also was secretary-treasurer of the Collieries Investment Co., 1921-1930, and for many years was secretary of the Illinois Coal Operators' Association.

During the World War, when Dr. Garfield was Federal Fuel Administrator, Dr. Honnold became fuel administrator for the Middle West and set up a central factgathering organization on coal in Illinois. He organized the Williamson County Coal Operators' Association, which eventually took in Franklin, Saline and other southern Illinois counties. He also took an active part in wage negotiations.

Obituary

A. L. Allais, president of the Columbus Mining Co., with extensive operations in the Hazard field of Kentucky and offices in Chicago, died in that city Oct. 15 of a heart attack.

15 of a heart attack.
Roy Threadgill, 42, superintendent of

150. Ryears ahead ... THE MACHINE of the FUTURE ... today!

NCREASED dipper capacity up to 33 cubic yards and greater work ranges on the 950-B are accompanied by a high speed cycle, ample power for heavy digging, economy of operation, and sturdy dependability, all of which mean steady production.

Machines in the field have demonstrated the ability of the 950-B to deliver, in actual operation, 70 to 80 complete digging cycles per hour. Easy, accurate control puts the full speed of the machine in the hands of the operator for steady, profitable, big output. Move-up delay has been practically eliminated by a new type of caterpillar drive and automatic leveling. The scientific application of power, the great strength of modern heat-treated alloy steels, and the correct engineering of the unit not only give you increased payloads, but also assure you dependable production in the hardest and most difficult overburden.

Bucyrus-Erie offers the mining industry various other sizes of stripping shovels and draglines including the 550-B, a companion machine to the 950-B with all the same modern features. There is also a complete line of Bucyrus-Erie Coal Loaders, Blast Hole Drills, Bit Dressers, Bulldozers and Bullgraders, Car Transporters, Walking Draglines, all sizes of Shovels, Draglines, Buckets and Dippers.



Binkley Mining Company of Indiana Seelyville Indiana

United Electric Coal Companie Fulton County. Illinois



Lone Star Cement Company Brazil S. A.



Truax-Traer Coal Company St. David. Illinois



Pittaburg and Midway Coal Mining Comp Pittaburg, Kansas

BUCYRUS - ERIE SOUTH MILWAUKEE, WISCONSIN, U. S. A.

BUCYRUS

the New River mines of the Brookside-Pratt Mining Co., Winfield, Ala., died Sept. 20 in a Birmingham hospital after an illness of several weeks. He had been with the company for several years, serving in various capacities until his appointment as superintendent early this year.

A.I.M.E. to Elect Officers

Nominations for election of officers and directors of the American Institute of Mining and Metallurgical Engineers on Nov. 9, to be voted on by mail ballot, have been made, nomination being tantamount to election. Daniel C. Jackling, president, Gallup American Coal Co., Gamerco, N. M., has been named for president, and the Coal Division has the following candidates: Chairman, Paul Weir, consulting engineer; vice-chairman, C. A. Gibbons general manager, Susquehanna Collieries Co.; members, executive committee (three years), Alfred W. Hesse, chief coal mining engineer, Buckeye Coal Co.; Robert H. Morris, general manager, Gauley Mountain Coal Co.; Julian E. Tobey, manager, fuel engineering division, Appalachian Coals, Inc.

Coal at Golden Gate Show

Coal will have a prominent place in the Golden Gate International Exposition, to be held at San Francisco, Calif., in 1939. Plans for the mining exhibit include a replica of a coal mine in full operation. By means of a shaft in the side of "Treasure Mountain" visitors will be enabled to enter the "mine," where actual working conditions will be reproduced. Lee Straub is head of the Division of Mines, Metals and Machinery of the exposition.

Illinois Institute to Meet

Timely topics will feature the forty-fifth annual meeting of the Illinois Mining Institute, which will be held Nov. 5 at the Hotel Abraham Lincoln, Springfield. President W. J. Jenkins, president, Consolidated Coal Co., will preside and the program will include the following papers: "Mine Management's Responsibility in Safety," C. F. Herbert, superintendent, safety engineering department, Bituminous Casualty Corporation; "Present-Day Mining Accounting," John W. Broadway, auditor, Bell & Zoller Coal & Mining Co.; "Modern Trend in Coal Mining," James H. Fletcher, consulting engineer; "The Will to Do It—Now," C. A. Reed, director, engineering department, National Coal Association, with discussion by Thomas Marsh, Iron Fireman Co.

At the annual dinner in the evening, George W. Reed, vice-president, Peabody Coal Co., and chairman, District 10 Bituminous Coal Producers' Board, will deliver an address on "Federal Regulation of the Bituminous Coal Industry," and there will be an informal talk by Charles M. Thompson, dean, College of Commerce and Business Administration, University of Illinois. There also will be exhibits by the U. S. Bureau of Mines, the State Department of Mines and Minerals, State Geological Survey, University of Illinois and a display of manufacturers' products.

Anthracite's Future Mulled Over At Governor's Get-Together

WIDESPREAD conflict of opinion as to how rehabilitation of the anthracite industry shall be effected marked the conference of operators, miners, bootleggers and truckers at the crowded meeting called by Governor George H. Earle of Pennsylvania in the Assembly Chamber of the House of Representatives, Harrisburg, Pa., Sept. 27. The Governor himself stressed a State commission to determine what mines should be operated and what quotas produced, and the leasing of idle mines to bootleggers at a small royalty. To the Lieutenant Governor, Thomas Kennedy, the solution lay in lowered freight rates, commissions, and stokers for domestic consumers. M. J. Hartneady, Secretary of Mines, thought that the reopening of mines for bootleggers only should be the plan. Operators.



Walter Gordon Merritt Counsel for anthracite operators

through their counsel, Walter Gordon Merritt, had no recommendation but to avoid upsetting the industry by ill-considered experimentation.

Expansion is over, declared Governor Earle. From now on it will be intensive, not expansive development we shall face. There is no longer a shortage of labor but a plethora. "The advent of labor-less fuels"—oil and gas—have demoralized the coal industry. The anthracite realm extends over into seven counties, in all of which the companies are in financial straits. He was not going to place blame on anyone for that condition, but clearly it called loudly for a remedy. Bootlegging is illegal, but what can be done about it? The men who do it have no other way of making a living. He wanted to find a way by which the bootlegger can find opportunity of mining legally under the protection of State inspection and Social Security.

He has investigated the Polish mines and the Anaconda Copper Co.'s mines, the regulations in Germany, Great Britain and Hungary. All are undertaking in a degree what he contemplates for the anthracite region. Speaking of bituminous coal, if it went from \$1.30 a ton to \$2, it would be feasible to hydrogenate it; so the outlook was not as hopeless as some think. G. S. Brooks, manager of the Anaconda's foreign mines, with 12,000 coal and other miners, a conservative Republican, had told him, and all others thereabouts had corroborated the statement, that government regulation is essential. Without it Mr. Brooks would close up and move out.

"I do not believe in governmental regulation of all industry," declared Governor Earle, "but only such as removed an irreplaceable resource." But regulation must be extended to the market and must not be confined to the operator. He would have the Pennsylvania Legislature enact a law creating a coal commission to regulate production and price. This commission should declare which mines should be worked to the best interest of miners and operators and quotas should be determined for each. The price structure perhaps should be regulated all the way to the consumer, but possibly the authority of the commission should extend only to the prices charged by the producers.

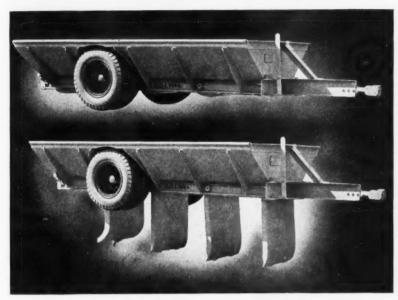
Operator Sought Martial Law

When bootlegging restraint had been urged, an operator had come to him with an engrossed declaration of martial law which he desired him to sign, asserted the Governor, but he doubted if even the operators really wanted it. He would have had to call out 2,000 men for at least a month, with the risk of bloodshed. On the return of the guards, bootlegging would have been resumed. The better way is to remove the cause of bootlegging and it will cure itself. We must "hang together or hang separately."

Stating that Dr. Garfield's exclusion of anthracite from the Middle West had given 10 per cent of the hard-coal market to soft coal, or 11,000,000 tons annually, Mr. Kennedy said that gas and coke had completed the embarrassment. Coal in New York was selling at \$10 a ton; yet oil was equivalent in cost to \$13 per ton of coal and 50c. per M. cu.ft. gas to \$17 per ton coal. Price was not the reason for the favor for these fuels but convenience. If the latter could be assured, the market would not only be recaptured but expanded. State College, the University of Pennsylvania and the University of Pittsburgh should work on this problem of convenience in coal stoking and heat regulation. The Dominion of Canada also would take 11,000,000 tons annually if the 50c. tax were removed. Premier Bennett had sold the Canadian coal consumer down the river to help the fruit industry. Remove the tax and the anthracite region can compete with Welsh and Indo-Chinese coal. Freight rates, especially on long hauls, should be reduced, especially to Canada, New England and the Great Lakes. The State even now is entering into the case for the reduction of rates before the Interstate Commerce Commission.

Opinions differed as to the desirability of State and federal legislation to rehabili-

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• We call it the "S-D Under-Ground-Hog," because about three of them will "root" more cash dividends and higher production records out of your mechanical loader than you have ever experienced.

Not long ago we advertised a record of three S-D Under-Ground-Hogs, handling — under the J. H. Fletcher system of mining — 300 tons of coal per shift. But now, if you are interested, we'll give you the details about a similar set-up of larger S-D Under-Ground-Hogs—averaging 550 tons per shift. Imagine it . . . only three S-D Under-Ground-Trailers in a vein 5 Ft. to 5 Ft. 6 Inches, averaging 550 tons of coal per shift. These trailers actually handled 670 tons in one day. This average record was made by S-D Under-Ground-Trailers measuring approximately 12 Ft. x 7 Ft. 4 Inches x 37 Inches height above dirt. Here's the answer to the mine superintendent's dream for maximum production. It dumps automatically without stopping - does away with all cost of track and other expensive mechanical transferring systems. Three mines have just purchased additional lots of S-D Under-Ground-

To see the S-D Under-Ground-Trailer is to realize immediately that a new source of increased profit has been discovered for your mine. We hope you're curious enough to get the complete details. Whether you need S-D Under-Ground-Hogs or not, get their interesting information at once.

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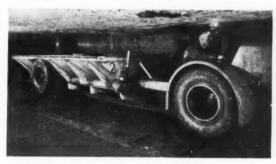
This, gentlemen, is high - powered "Pork". With every "root" - with every "grunt", they make your profits grow.



At the Loader—no costly tracks to lay—and none to take up—no time lost in car switching.



At Pit-about to dump automatically.



Dumped—automatically and instantaneously—never out and never over, always moving on.

tate the coal industry, added Mr. Kennedy. He favored a federal law or a correlation of State and federal statutes. New England dealers were adding \$5 a ton on the cost of anthracite for their services. He could not see how a State law could meet that situation. A correlation of price between coal, oil and gas could be provided only under a federal statute. The State might be able to keep natural gas beyond its borders, and the State of Pennsylvania was endeavoring to exclude it. Under the British allocation system, a mine owner need not take the tonnage from his own mines but could buy it from other mines, but Mr. Kennedy believed that, under the quota system, buying of coal should not be allowed.

Federal legislation, declared Governor Earle, is preferable to State statutes, if such laws can be passed, but federal legislatures will be slow to recognize the needs of a single State. Unfortunately, the last Congress did little, whereas the State Legislature enacted a number of helpful bills. California and Florida back up their citrusfruit growers, but Pennsylvania does not thus support its coal producers.

The Anthracite Coal Commission, de-clared W. Jett Lauck, its chairman, has pursued its aims without any pressure from the Governor. Its bootleg committee had already made its report. But this is a side issue to the whole question of the rehabilitation of the coal industry, which remains to be tackled. Regulation needed in the interest of the public. He wished it were possible to make recommendations that would enable State legislation to be enacted that would control the industry completely from mine to market, such setting up a single marketing agency. If, by a federal law, the reserve acreage not now needed for operation were set aside, it would create a federal reserve; if by a State law it would be a state reserve, which would control the parks and timbered areas which would be created. his private opinion this latter would be the more desirable.

Prosperity Is Aim of All

When R. E. Taggart, president, Philadelphia & Reading Coal & Iron Co., was called on by the Governor to express his views, he introduced Mr. Merritt to speak for the Anthracite Institute, which represented the large majority of the operators. All agree, said Mr. Merritt, that prosperity is the aim—the discussion is as to the means. Care must be taken not to imperil by experiments an industry that employs 100,000 men, distributes in wages \$150,000,000 and disburses \$250,000,000 annually. Those employed are working only about half time. It would not do to restrict that opportunity to labor.

Market for anthracite has already shrunk 40 per cent. Hence it is essential not to add to the burdens of the industry or increase its operating costs and, therefore, its prices. No inefficiencies in production had been alleged, as far as he knew; certainly the Commission had not made any such allegation. External competition, not internal conditions, had led to the industry's undoing. Wild rumors, added Mr. Merritt, have alleged that the coal operators do not wish to sell coal and that the industry is not equipped to sell it, but surely, with an investment of \$500,000,000, the coal operator could not afford to see

his market shrink without the utmost consternation. Some operators have been said to be interested in oil, but there is no justification for this unverifiable surmise. Lack of vision has been charged also, but no men sell coal at a loss except those who are anxious to sell, and the price is now \$2 per ton lower than in 1930.

The industry is gaining, Mr. Merritt hopefully asserted. Already it has reached 52,000,000 tons annually. The institute had hoped that freight rates might be reduced and is doing what it can to back up attacks made on the freight-rate structure, interstate and intrastate, but it must have help from State and federal institutions. As in every industry, anthracite has too many dealers. Commissions are not too high as



Thomas Kennedy Spokesman for union miners

a whole; some are and some are not. Care must be taken not to crowd the dealers unduly lest there be reprisals. The coal operator must avoid, in Mr. Merritt's opinion, the raising of resentment, as had been done by the State Legislature in the past by the imposition of a tax on anthracite. It would be best for a federal body to raise or lower dealers' prices, as that would cause less resentment.

Bootlegging must be stopped. It should be treated as causing unemployment and as a matter of law enforcement. Too much of such enforcement, admitted Mr. Merritt, might be undesirable, but the few men involved would not cause armed insurrection. It is well to make such interference palatable by considerate measures, but it is not to be forgotten that this is no temporary condition. Fifty thousand men will be idle for many years, and the burden of their support cannot permanently be thrown on any industry just because it is the sole means of employment in a com-No resumption of unprofitable munity. mines, no mining of coal for which there is no market, can be safely imposed on the coal operator, struggling vainly to keep his head above water. The cost must be spread on society in general if the burden to be met by any group whatsoever.

If these mines which the companies have found it unprofitable to work were leased to the miners, such mines, asserted Mr. Merritt, could not possibly survive. Bootleggers pick the cream off the surface,

leaving the operator a property that he cannot hope to mine without a burden that will make operation unprofitable. Continued subsidies would be necessary if the miners were to lease the mines.

Operators are divided on the principle of federal legislation; half of them would like to see a simulacrum of the Guffey bill enacted for the anthracite region. Miners also would like national legislation, but they do not approve all the provisions of the Guffey-Boland bill. Operators would welcome a control of sales but not State ownership of mines, and if the State owned the mines, how could it be more successful in meeting competition than the owners who try their best to sell and make a profit?

Studies in Great Britain, added the Governor in turning over the chair to David S. Lawrence, Secretary of the Commonwealth, to go to Philadelphia, showed the industry in this country produced more tons per man employed, but the anthracite industry had been ten years behind the oil industry in mechanizing domestic combustion and in heat regulation. One Standard Oil Co. official had said to him that the defective tactics of the coal industry in meeting the competition of oil was a "boon from heaven" to the oil producers.

Urges Hiring of Bootleggers

Lease the idle mines, recommended Mr. Hartneady, to responsible operators who should employ only experienced miners and employ none who had been drawn from outside the anthracite region by the prospect of bootlegging and running bootleg breakers. As the reopening of closed and drowned mines is too costly to be profitable, the men at work at these mines in re-habilitation should receive federal relief and be paid enough additional wages to equal the scale of payment for such work by the company performing the rehabilitation. Only bootleg miners should be employed, of which there were only about 3,500. F.o.b. prices should be set at all mines based on the least profitable operations, and this price should be duly advertised so that the general public, which believes that the mine operators and miners are receiving too much, may be apprised of the spread between cost of production and selling price. Under present conditions coal could not be sold for \$11 a ton unless the mining were done as a free gift by

miner and operator.

State regulation is desirable, asserted Earl Humphrey, Independent Miners and Truckers Association. So also is leasing of coal to the miner, but would this provision be permanent or temporary? Trucking of coal from the Northern Anthracite field has almost ceased with the rigid control established. Mr. Hartneady's scheme, he said, favored the "bootleg" miner (he did not use that word) as against those who had not entered that occupation or who, born in the region, had been prevented from obtaining work.

No mere expansion will take care of all the idle miners, declared P. J. Brennan, also of the Independent Miners and Truckers Association. Seventy-five to a hundred thousand men are in need of work. The change must be Jundamental and must envision a doubled tonnage covering, among other matters, operation of all closed mines, establishment of recreation centers, care of unemployed, expansion of markets, lowered freight rates and the 30-hour week. No



When the end of 1937 rolls around and industry adds up the items of plant operating cost directly attributable to friction, an amazing total of four billion dollars will appear at the foot of the column! A staggering loss to American industry in a single year.

What is being done to reduce it? A relentless battle is being waged against the wastes of friction every day by Gulf's large staff of trained lubrication engineers. These men, real lubrication specialists, work with plant operating men to make machines produce on a more efficient basis.

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men should be removed from bootleg mines, but they should be continued in operation

until all men are employed.

Mine-price cuts of \$1.50 a ton on March 8 of this year were not reflected in retail cuts in New York, alleged Charles Weinstein, Golden Glow Coal Co., Bronx, N. Y. Eighty per cent of the coal, he added, brought to New York is from the mines of operators represented in the Anthracite Institute. Little independent coal, bootleg or other, enters New York. The combination has driven it out. Yet bootleg was the best of coal; it had no stripping or bank coal mixed with it. He had found it difficult to buy coal for trucking. Operators would tell him they would consider sales with payment guaranteed, but they were still considering it.

Had truck trade been recognized by the companies, bootlegging would never have been established, was the assertion of William MacMaster, Shenandoah Coal Labor Union. It was the difficulty of getting legitimate coal that drove the truckers to

the bootleggers. Coal should be declared a basic utility, advised Samuel Middleman, International Workers Organization; all abandoned collieries should be taken over by the State, railroad influence in the coal industry should be eliminated, working hours should be shortened, bootleggers should be permitted to remain at work, educational and recreational facilities should be extended and P.W.A. and W.P.A. developments should be instituted immediately.

Not only bootleggers but all idle men should be employed, according to Joseph Glaski, Central Labor Union, Shenandoah. Villages should be established with factories like that at Greenbelt, near Washington, D. C. If all the men out of work were put to mining anthracite, there would be too few days' work for the rest. There are already too many men in the mines.

If only the operator had applied to getting business the effort he expended in eliminating the bootlegger, he would have no lack of market, injected Joseph Donahue, Mt. Carmel, General Mine Committee. If double and triple shift were dispensed with, not only would the men not shoot the coal to pieces to assure themselves that their places would be "squared up" at every shift but the idle mines would have to be recovered.

The chair invited the operators, mine workers and independent miners and truckers to name three men apiece to represent them on a committee to meet after adjournment to prepare a scheme for a betterment of the industry. The committee personnal chosen was: For the operators, R. E. Taggart, president, Philadelphia & Reading Coal & Iron Co.; J. B. Warriner, president, Lehigh Navigation Coal Co., and N. D. Stevens, president, Stevens Coal Co.; for the United Mine Workers, Martin F. Brennan, Shamokin; Michael Kosik, Scranton, and Hugh F. Brown, Hazleton; for the Independent Miners and Truckers, Earl Humphrey, Shamokin; Joseph Brennan, Heckscherville, and Lester Kobel,

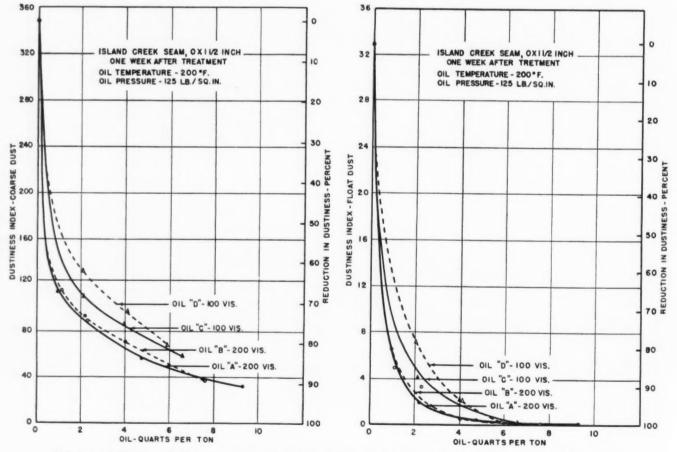
Battelle Finds Higher Viscosity Oils More Effective in Dust Control

S PRAY OILS with viscosities of approximately 200 seconds are more effective agents for the dustless treatment of coal than oils of 100-second viscosity, according to data made public last month by the fuel research laboratories of Bituminous

Coal Research, Inc., at Battelle Memorial Institute. This conclusion is graphically illustrated in Figs. 1 and 2, which show the relation between the coarse and float dustiness indices of $0x1\frac{1}{2}$ -in. Island Creek seam coal and the quantity of oil applied

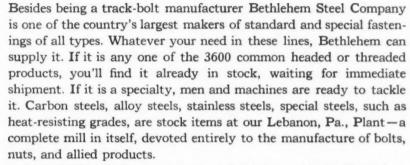
per ton of coal for four oils, two of which had Saybolt Universal viscosities of approximately 100 seconds at 100 deg. F. and the other two had viscosities of 200 seconds. The data show the initial effectiveness of treatment as determined one week after application of the oil.

The results were practically identical for the two 200-second oils based on either the coarse or the float dustiness. The data for those oils are the same as those presented in the preliminary data from this



Relation of Dustiness Indices to amount of 100- and 200-second-viscosity oil applied to Island Creek seam 1\(\frac{1}{4}\times 0\)-in. coal. Fig. 1 (left) shows the coarse-dust index; Fig. 2 (right) the float-dust index. In each case, determinations were made one week after treatment; oil temperature was 200 deg. F. and the oil pressure was 125 lb. per square inch.

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research, published in Coal Age in May, 1937 (p. 228). The coal is treated, it will be recalled, in an experimental treating machine which simulates tipple conditions. The dustiness is determined in a dust-testing cabinet which simulates the dropping of coal into a bin. The coarse dust is that which settles in the first two minutes and the float dust is that which settles in the next eight minutes after dropping the coal.

Although the curves for the two 100second oils have the same general shape as those for the 200-second oils, yet the two oils differed in effectiveness and both were considerably less effective than the 200-For example, it can be seen second oils. that it took approximately four quarts of the 100-second oil "D" to give a reduction in dustiness of 72 per cent of the original dustiness, whereas this reduction was obtained with only about two quarts per ton with the 200-second oils. With increasing concentrations of oil, the difference in the effectiveness of the two 100-second oils decreases and the ratio of the quantity of these required to that of the 200-second

oils for the same reduction in dustiness decreases.

Samples of treated coals are stored in outdoor exposure and tested for dustiness at intervals of three months. After six months' exposure the laboratory at Battelle reports that the difference between the effectiveness of the 200-second and 100second oils decreases somewhat, but the dustiness of the samples of coal treated with the heavier oils remained definitely less than those treated with the same quantities of the lighter oils. Complete data on the relative permanence of the several oils used after outdoor storage, on the effectiveness of oils of higher viscosity, on petrolatum, and on the relation of the size and type of coal to dust elimination will be included in a paper to be presented at the annual meeting of the A.S.M.E. in New

York in December.

The research, which is still in progress, is sponsored jointly by Bituminous Coal Research, Inc., Standard Oil Co. (New Jersey), Sun Oil Co., and Viking Manu-

facturing Co.

New Call for Better Cleaning Forecast At West Virginia Coal Conference

PREPARATION EXPERTS will be than ever before in the history of the industry, predicted P. C. Thomas, vice-president, Koppers Coal Co., at the first West Virginia Coal Conference on Combustion, held at Morgantown, Sept. 29-30. With prices fixed by the National Bituminous Coal Commission, explained Mr. Thomas -one of several speakers at the conference sponsored by the School of Mines of the State University and the West Virginia Coal Mining Institute to study the combustion and utilization of coal-there will be a general scramble by competing mines to put their preparation on a comparable basis with neighboring operations which have been given better classifications for their coals.

Illustrating his formal paper on the history and practice of preparation with slides showing every stage in the growth low-volatile cleaning and sizing since 1880, Mr. Thomas asserted that the lowvolatile industry suffered its hardest blow between 1910 and 1920, when the byproduct oven sounded the death knell of largescale production of beehive coke and cut the demand for slack coal. The necessity of reducing screenings percentages by making sizes smaller than egg brought on the washery and improved screening facilities. But the conquest of new markets and increased production more than justified the expenditures required.

Since 1930, continued Mr. Thomas, demand for smaller sizes has been growing at the expense of lump. In one plant a pick-type breaker with integral screen is breaking 7-in. lump with an increase of only 1 per cent in the total screenings yield. Cardox shooting has increased the proportion of plus 1-in. lump 6 per cent. A combination of Cardox and the pick breaker, which brings the net increase in 1-in. lump to 5 per cent, may offset any first-cost disadvantages. There is hardly first-cost disadvantages. There is hardly a plant, he added, where layer loading cannot be employed to overcome excessive degradation and lack of uniformity.

Principles of surface-plant preparation also were discussed by Prof. William A. Straub, West Virginia University, who grouped wet and dry systems as follows: I—Wet Systems: (1) Launder washers, (2) jigs, (3) wet concentrating tables, (4) tubs and cones, (5) thickeners and classifiers, (6) dense liquid separators, and (7) froth flotation. II-Dry Systems: (1) Hand picking, (2) mechanical pickers and spirals, (3) breakers and crushers, (4) air and jigs, and (5) miscellaneous. All these machines "will work efficiently when properly operated and when treating material for which they are designed or when making some special product." One

SALES OF STOKERS SPURT

Sales of mechanical stokers in August last totaled 13,459 units, according to statistics furnished the U.S. Bureau of the Census by 108 manufacturers (Class 1, 66; Class 2, 44; Class 3, 42; Class 4, 40; Class 5, 16). This compares with sales of units in the preceding month and 9,557 in August, 1936. Sales by classes in August last were: residential (under 61 lb. of coal per hour), 11,590 (bituminous, 10,385; anthracite, 1,205); small apartment-house and small commercial heating jobs (61 to 100 lb. per hour), 760; apartment-house and general small commercial heating jobs (101 to 300 lb. per hour), 657; large commercial and small high-pressure industrial steam plants (301 to 1,200 lb. per hour), 365; high-pressure industrial steam plants (over 1,200 lb. per hour), 87



of the duties of the preparation engineer is to fit the right system and the right machine in the right place and when that is done to keep the machine operating effectively."

The true inherent ash, he declared, is only the original inorganic matter of the coal-forming plants. Apparently pure coal having an ash content as low as 2 or 3 per cent and as high as 20 or 25 per cent can have the other foreign material mixed so intimately by the effects of dust blowing, water currents or percolation that it must be considered as part of the coal itself. Prof Straub also explained screening and gravity tests and developed a set washability curves for a selected

Both the chemistry and the mechanics of combustion were touched upon by W. W. Hodge, professor of chemical engineering, West Virginia University. Available surface area per unit of volume, he explained, increases tremendously as pieces coal are broken to smaller size. A cube of coal of 1-ft. edge dimension has 864 sq.in. of surface, but if that cube is pulverized to 60 to 70 per cent through a 200-mesh screen the total surface available for rapid combustion is increased to 1.267,-000 sq.in., or 1,466 times the original surface of the cubic foot of coal.

Important factors in combustion, as summarized by Prof. Hodge, were: (1) Chemical and physical nature of the combustible; (2) maintenance of: (a) the proper depth and relations in the bed, (b) temperatures above the ignition point, (c) high temperatures in the combustion chamber, (d) proper quantities and proportions of primary and secondary air, (e) of favorable conditions for the rapid diffusion of oxygen through the surface films of solid fuels. Preheating of air and of certain fuels often reduces fuel cost and produces high temperatures and rapid rates of combustion.

Suggests Training in Sampling

Operators, said W. D. Steele, chemist, Consolidation Coal Co., would do well to sponsor a campaign of education in the proper methods of coal sampling and the coal salesmen should promote the idea of averages of coal samples to the consumer rather than individual analyses. Importance of accurate coal sampling is increasing because the customer is demanding greater uniformity of quality, and he must also have an accurate analysis in order to operate his plant to use the coal to the best advantage.

The sample determines to a great extent whether the laboratory findings are true of the product. Men should be highly trained for sampling and both laboratory men and samplers are handicapped if they have not had training in both branches. Taking a channel sample is a waste of time unless the place to be sampled has been thoroughly prepared to prevent contamination and to assure that no stratum of the seam is represented out of proportion to its thickness. Sectional seam sampling was suggested as a means of checking the whole seam sample and of investigating changes of mining methods to suit the seam.

Consolidation practice, continued Mr. Steele, is to sample at certain intervals all grades and sizes at each mine, taking 300-lb. sample to each railroad car loaded. An analysis of an increment from this sample is made and a composite sample

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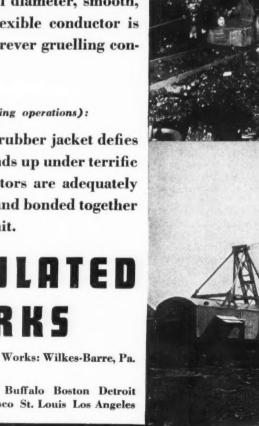
Hazacord Shovel Cable's dense all-rubber jacket defies abrasion from sharp rocks and stands up under terrific punishment. The separate conductors are adequately insulated for the required voltage and bonded together with the sheath into an integral unit.

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also is made of each particular size and grade by weighted proportions. The 300-lb.-increment analysis is accepted only as an indication of the maximum and minimum differences in the loading. The composite of all increments of that particular size is the true sample. This conforms to the sampling regulations of the American Society for Testing Materials.

A 4-ton-per-hour hammer-mill type sampling crusher mounted on a truck, as recommended in U. S. Bureau of Mines Information Circular 6545, is used. Instead of a halving riffle on the crusher feed, however, a battery of riffles are fastened to the discharge end to speed the preparation of a sample. The sample is crushed to 95 per cent below $\frac{3}{16}$ in. and the automatic riffling by stages in series delivers one-sixteenth ready to work down to a laboratory sample and casts fifteen-sixteenths to the refuse.

Uniformity the Great Desire

"There is one thing," observed C. J. Allen, combustion engineer, New England Coal & Coke Co., Boston, "on which all markets agree. It doesn't matter what type of coal a consumer uses, whether it is a high-volatile, low-volatile, free-burning or coking, high-ash or low-ash coal, he wants his coal to come to him the same all of the time and in every shipment. He wants the analysis to be the same as the sample car. He wants the preparation the same and the sizing the same." Analyses are invaluable not because they show the constituent percentages but because they indicate what performance can be expected from the coal. In the coming years, according to Mr. Allen, the coal markets will be for those who best understand the consumer's problem and the performance of which the coal is capable.

Approximately 20 per cent of the coal produced, said Mr. Allen, is carbonized in coke ovens and gas plants; since this is a highly specialized market, the selection of that coal soon became a matter of analysis. Railroads, where there is a choice of fuels, usually select a fairly free-burning coal of at least medium volatile. Stationary steam plants vary widely in design, and the variety of coals which are used with good results is as wide as the range of coals produced. In the publicutility field power generation comes more and more from pulverized fuel and all types of coal are being used for that purpose; however, 22 to 30 per cent volatile is the general preference and low ash always is desirable.

"We are not out of the experimental period in determining coal qualifications for the small or automatic stoker market, which so far has only been scratched, but several requirements appear as clear. Sizing is important, a free-burning coal is desirable and it should be fairly high-volatile in order to respond quickly to change of load." Grindability is important for the cement industry but the principal requirement is high-volatile long-flame...

Consumers in increasing numbers are becoming convinced of the greater possibilities of steam cost savings by using coals fitted to the plant rather than by price juggling, said H. A. Glover, assistant to the president, Island Creek Coal Co., in a paper read by H. N. Halloway, fuel engineer of that company. "When we as coal people become convinced of it,

then the steam plants will make cheaper steam and the coal companies will get more money for their coal by the simple method of fitting our coals to the plants where they can earn the most money." Every steam plant "is a law unto itself" and individual studies must be made of each plant. "There can be no rule which will cover the application of steam coal to any considerable number of plants."

It is the use value and not the analytical for which the consumer pays. Factors besides the analytical which govern use value are: (1) Top size, (2) size consist, (3) coking, caking or free-burning, (4) ignition point, (5) flexibility, (6) ash fusion, (7) character of clinker, (8) structure, (9) uniformity. Tables of comparative steam-cost tests on several plants, in each of which were tried different coals, were presented to show the advantage of buying on steam-cost evaluation instead of on price, analytical specification or plant specification.

That small stokers must be specifically suited to the coal to be used and vice versa was the underlying theme of a paper on "Automatic Heat With Coal," by R. S. Layne, Pocahontas Fuel Co. As a result of a research and development program begun nine years ago "for its own protection for the future," that company promotes a stoker designed especially to furnish automatic heat with its coal. On the wrong attitude of stoker manufacturers and of coal dealers in not attempting primarily to offer the customer "real satisfactory results" with automatic heat instead of just selling so much merchandise, rests the blame for slower progress than that to which automatic heat with coal was entitled. "The time to have a customer's confidence in coal is while he is using it—not after he has given up in disgust because of some basically petty annoyance."

Coming Meetings

- Illinois Mining Institute: annual meeting, Nov. 5, Hotel Abraham Lincoln, Springfield, Ill.
- •Indiana Coal Operators' Association: annual meeting, Nov. 16, Terre Haute, Ind.
- Southern Appalachian Coal Operators' Association: annual meeting, Nov. 19, Knoxville, Tenn.
- Ohio Valley Section, A.I.M.E.: fall meetings, Nov. 20, Charleston, W. Va.; subject, coal preparation; Dec. 6, Columbus, Ohio; subject, fuels.
- New River Coal Operators' Association: anual meeting, Dec. 14, Mountainair Hotel, Mt. Hope, W. Va.
- Iowa Coal Operators' Association: annual meeting, Dec. 14, Fleming Building, Des Moines, Iowa.
- •Colorado Mining Association: annual meeting, Jan. 10 and 11, 1938, Pueblo,
- American Engineering Council: annual meeting, Jan. 13-15, 1938, Washington, D. C.
- Fifth International Heating and Ventilating Exposition: Jan. 24-28, 1938, Grand Central Palace, New York City.

Speaking on specifications of stoker coal, K. C. Richmond, editor of Coal-Heat, said that from the householder's viewpoint the factors which influence the selection of stoker coals in order of importance are: (1) Dustless treatment, (2) ease of operation, (3) recommendation of stoker dealer or stoker salesman, (4) low-ash content, (5) recommendation of the coal merchant, (6) high B.t.u. content, (7) special sizing, (8) price per ton, (9) recommendations of other stoker users, (10) freedom from fines, (11) low freight rates. From the viewpoint of the user of commercial stokers the corresponding lineup is: (1) Price per ton, (2) recommendation of stoker dealer or salesman, (3) high B.t.u. content, (4) ease of operation, (5) low freight rate, (6) recommendation of other stoker users, (7) recommendation of coal merchant, (8) low-ash content. (9) special sizing, (10) freedom from fines. With the small stoker user, he concluded, "price is secondary. Dustless treatment and ease of handling are paramount. Cleanliness, not a coal analysis, is the number one factor."

Discussing power-plant testing, John B. Grumbein, professor of power engineering, West Virginia University, outlined the general types of power plants and traced the developments, including high pressures and high super-heats, which have brought higher "dollar efficiency." Integral furnace boilers using pulverized fuel were described by H. A. Ingram, representing the Babcock & Wilcox Co., which recently installed one of its complete "steam units" of that type in the university heating plant. The complete unit includes pulverizer, air blowers, furnace, boiler, superheater, controls and instruments for obtaining maximum efficiency. Mr. Ingram said that efficiencies of above 84 per cent are being obtained with units of this integral-furnace type.

→ New Preparation Facilities

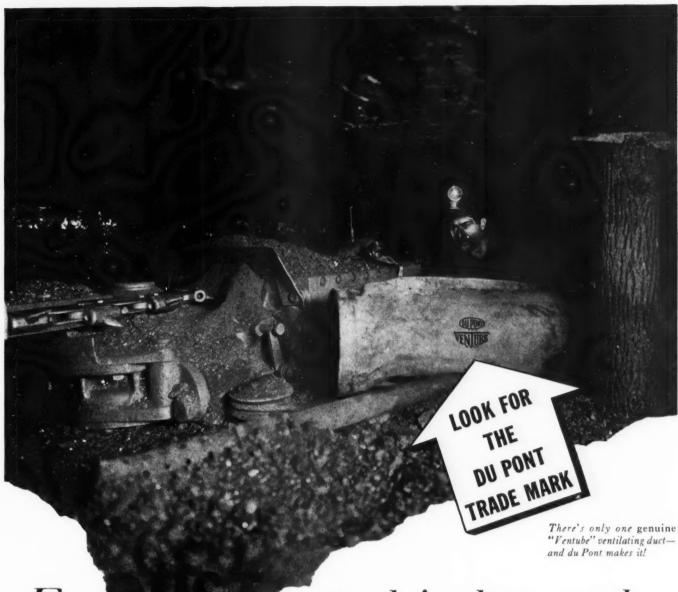
AMERICAN SMELTING & REFINING Co., Dawson, N. M.: contract awarded Jeffrey Manufacturing Co. for a single-compartment Jeffrey diaphragm jig to wash pea coal; maximum capacity, 60 tons per hour; to be installed in existing plant.

S. W. BLAKESLEE Co., Otto Colliery, Branchdale, Pa.: contract awarded Wilmot Engineering Co. for complete washing equipment for anthracite nut, pea, buckwheat, rice, barley and No. 4 and No. 5, including five Hydrotator units and a classifier to recover a maximum quantity of Nos. 4 and 5; also Parrish sizing feed shakers, picking tables, roll crushers, conveyors, etc.; capacity, approximately 1,150 tons per 7-hour shift.

BROOKSIDE PRATT COAL MINING Co., Birmingham, Ala.: contract awarded Jeffrey Manufacturing Co. for washed-coal conveyor and accessory equipment to be installed in existing washing plant.

CARBON FUEL Co., Carbon, W. Va.: contract awarded Roberts & Schaefer Co. for addition to existing cleaning plant to consist of Stump Air-Flow cleaning units and machinery to handle 1x0-in. coal; capacity, 50 tons per hour; completed Oct. 15.

FREEMAN COAL Co., near East St. Louis, Ill.: contract awarded Jeffrey Manufac-



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tilating duct on the market! The extraheavy, long-fibered Hessian cloth is both coated and impregnated with resistant rubber. The tear resistance is as great in the warp direction as in the filler. Concussion, damp and dry rot, gases, acid and fungus will not harm "Ventube."

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November, 1937 — COAL AGE

turing Co. for rescreening plant for dedusting stoker coal; equipment will include tour Jeffrey-Traylor electrical vibrating screens to handle 200 tons per hour, with provision for future extension to increase capacity to 250 tons per hour; accessory equipment will include scraper and belt conveyor with railroad-car loading-chute paraphernalia.

ISLAND CREEK COAL Co., Mine No. 1, Holden, W. Va.: contract awarded Jeffrey Manufacturing Co. for three-compartment Jeffrey-Baum jig to handle maximum capacity of 250 tons per hour of refuse from primary hydroseparator units.

ISLAND CREEK COAL Co., No. 1 mine, Holden, W. Va.: contract awarded Roberts & Schaefer Co. for steel preparation plant equipped with Marcus screens, hydroseparators and Stump Air-Flow cleaning units; total capacity of plant, 600 tons per hour; to be completed March 1, 1938.

RED JACKET COAL CORPORATION, Rittermines, W. Va.: contract awarded to Jeffrey Manufacturing Co. for addition to existing tipple of a washing unit consisting of single-compartment Jeffrey diaphragm jig to handle 90 tons per hour of nut and pea coal; accessory equipment will include raw and washed-coal conveyors and water-circulation system; settling tank will be of standard Jeffrey design with skimming weirs for clear water and sludge conveyor.

SLOSS-SHEFFIELD STEEL & IRON Co., Lewisburg mine, Lewisburg, Ala.: contract awarded Deister Concentrator Co. for Deister-Overstrom "Diagonal-Deck" coalwashing table for treatment of \$ x 0-in. jig refuse, handling a feed of 6 tons per hour.

VALLEY VIEW COAL Co., near Pittston, Pa.: Contract awarded Chance Coal Cleaner for a breaker to re-treat refuse bank of Ewen colliery; equipment will consist of chain and flight intake conveyor, platform shakers, picking tables, crusher rolls, washing and sizing screens, and 15-ft. Chance cone for cleaning stove to barley inclusive; plant will have capacity for receiving material at rate of 220 tons per hour with an output of 44 tons per hour, though the rated capacity of the equipment on mine-run material is four times as great; to be completed Dec. 15.

Westmoreland Coal Co., Magee mine, Yukon, Pa.: Contract awarded United Engineers & Constructors, Inc., for complete coal-washing and preparation plant; equipment to consist of 12-ft. Chance cone with auxiliary apparatus, shaking screens, loading booms, Bradford breaker, and Cochrane plant for treating mine water; capacity, 350 tons per hour of 6 x ½-in. size.

G. S. Rice Retires at 71

George S. Rice, chief mining engineer, U. S. Bureau of Mines, retired from the Bureau's service Sept. 30. He reached the age limit a year ago, but his service was extended by executive order. Born in 1866 and educated at the School of Mines, Co'umbia University, he had been in the government service since 1908, when he joined the Technologic Branch of the U. S. Geological Survey under Dr. Joseph



George S. Rice

A. Holmes and began the study of safety practices in Great Britain, Belgium, France and Germany. On his return to this country he initiated an extensive investigation of coal-mine explosions.

Designing the first experimental mine in the world, at Bruceton, Pa., shortly after the organization of the U. S. Bureau of Mines he carried on studies that have had far-reaching effect in curtailing mine-dust explosions. He demonstrated that mine dusts were highly explosive and that many mine explosions thought to have been due to gases were really caused by coal dust. He also showed that these disasters could be largely prevented or limited by the use of rock dust in the mines. In 1924 he was appointed chairman of the newly organized Mine Safety Board of the Bureau of Mines, in which capacity he was instrumental in harmonizing the points of view of members of the Bureau's staff on matters of safety.

Personal Notes

Orville Andrews has been appointed foreman at the Martin mine of the Deep Hollow Coal Co., Coalburg, W. Va.

D. P. BELCHER has been made foreman at the Norfolk and Caswell Creek mines of the Pocahontas Fuel Co., in McDowell County, West Virginia.

C. A. CABELL, president, Carbon Fuel Co., and D. C. Kennedy were reelected president and executive secretary, respectively, at the 33d annual meeting of the Kanawha Coal Operators' Association. Mr. Cabell has been at the head of the organization for several years and Mr. Kennedy has held his present post since the association had its inception.

JOHN C. Cosgrove was reelected president of Bituminous Coal Research, Inc., at a meeting of stockholders and directors held Oct. 7 at Pittsburgh, Pa.

SAMUEL COWLEY, superintendent of the Sunnyside mine of the Utah Fuel Co., at Sunnyside, Utah, has been transferred to the company's mine at Castle Gate, Utah.

ALDON GORE has been named superintendent at the Dabney mine of the Hutchinson Coal Co., Kleenkoal, W. Va.

FRED HARLESS has been appointed foreman at Mines Nos. 1 and 2 of the Webb Coal Mining Co., in Boone County, West Virginia.

F. B. LOCKHART has resigned as vicepresident and director of the Hillman Coal & Coke Cos; operating in western Pennsylvania. For the present, however, he continues to discharge the duties of chief sales executive.

W. A. RATCLIFF has been made foreman at the Junior mine of the Red Jacket Coal Corporation, Red Jacket, W. Va.

James T. Reynolds, Stollings, W. Va., has been appointed superintendent of Lorado mines Nos. 1, 3 and 4 of the Lorado Coal Mining Co., Lorado, W. Va., effective Oct. I.

E. E. RITTER has resigned from the presidency of the Red Jacket Coal Corporation, Red Jacket, W. Va., effective Oct. 1. He became head of the corporation in August, 1936, on the retirement of his uncle.

J. J. SNURE has been named superintendent of Mines Nos. 1, 3, 4 and 5 of the Raleigh-Wyoming Mining Co., in Raleigh County, West Virginia.

A. E. Thompson, until last summer superintendent of the Standard Coal Co.'s mine at Standardville, Utah, and since then connected with the Sunnyside mine organization of the Utah Fuel Co., at Sunnyside, Utah, has been made superintendent of the latter mine, vice Samuel Cowley, transferred.

J. R. Wilson has been elected president of the Stith Coal Co., operating at America, Ala. Other officers named are: HAROLD MCDERMOTT and HUGH STITH, vice-presidents, and W. H. PARKER, secretary-treasurer.

L. E. Woods, has resigned as chairman of the board, Red Jacket Coal Corporation, Red Jacket, W. Va., and been elected president and general manager, vice E. E. Ritter.

C. E. Woodson Jr., has been made foreman at Mines Nos. 1 and 2 of the Milburn By-Products Coal Co., Milburn, W. Va.

Acetylene Association Meets

The International Acetylene Association will hold its 38th annual convention Nov. 10–12 at Birmingham, Ala. Three afternoon sessions, to be held at the Tutwiler Hotel, will be devoted to the following subjects: "Speeding Manufacture and Construction With Oxyacetylene Welding," "How and Why to Use Oxyacetylene Cutting" and "Maintenance and Operations Uses of the Oxyacetylene Process." In the evenings of Nov. 10 and 11 roundable discussions will be held in the Phillips High School auditorium, the first to be an engineering session and the second an operating session.

Dr. James Shelby Thomas, president, Chrysler Institute of Technology, Detroit, Mich., will deliver the keynote address, on "New Frontiers for Smart People." In addition there will be an inspection trip arranged with the cooperation of the Ten-

nessee Coal, Iron & Railroad Co.

AS AN EXPLOSION YDRAULIC OIL!

Stalled Loading Machines Threatened this Mine with a Complete Shutdown—Until Shell Solved the Problem!

THE WRONG KIND OF HYDRAULIC OIL in a loading machine can cripple production just as effectively as a devastating explosion! When balky loading machines started to threaten production, the Standard Coal Company of Wheatland, Ind., had to move fast. Shell was called in-immediately.

Working with Leon Ruff, Superintendent, and Hubert Wise, Chief Mechanic, Shell made a complete survey. The loaders, operating at high speed all day, were heating their hydraulic oil to as high as 175° F. Foaming resulted. Failure of the oil at this extreme temperature was responsible for loss of power and stalling.

Drawing on their experience in the mining industry, Shell men recommended a hydraulic oil especially developed to resist the high temperature met in this type of equipment. The danger of a shutdown was averted.

Subsequent tests showed this Shell Oil to be a completely satisfactory hydraulic medium in every way. The Standard Coal Company reports that the use of this Shell Oil has resulted in increased power output, lower maintenance costs and more dependable service, day after day.

Shell helped solve this problem through the experience gained in meeting problems similar to it many times before. They had the ability to apply the right oil at the right time. This plus in lubrication, known as Shell's "Invisible Element," is always available to you. Simply phone or write your nearest Shell office.

CLOSED

SHELL COAL LUBRICA

Safety as Means to Operating Economies Shown at Safety Council Sessions

NEW approaches to safety were indicated in the addresses and discussions at the Mining Section of the National Safety Council, Kansas City, Mo., Oct. 12-14. Safety was advocated not alone for its humanitarian value or as an escape from compensation burdens but as a means of operating with maximum efficiency. Even if death and injury ceased to be painful experiences and if compensation for these misadventures did not have to be paid, safety in operation still would pay big dividends to the operator because in its train come operating economies of no mean order.

Mine operators who have made profits during the lean years of the depression recognize that the continuation of their safety programs has a definite part in keeping their operations "out of the red," stated J. H. Richardson, safety director, Climax Molybdenum Co., at the afternoon session of Oct. 11, with C. W. Gibbs, general manager, Harwick Coal & Coke Co., in the chair. "When a mine gets a reputation for unsafe working conditions, you will notice an influx of poor workers. The good men leave; the poor ones stay, for the poor worker realizes that he cannot get work in an organization that demands efficiency and ability. capable men, no organization can exist, and a capable man is a safe man!

"Standardization of jobs is the biggest step an organization can take toward improving underground or surface efficiency. I also believe that on the standard tasks, the accident risk has been lessened 50 per cent. . . . Our company has figured that we saved during 1936 by our program about \$500,000, if we consider as a base the year we undertook a definite program." Safety and efficiency are "sisters under the

Dangerous Jobs Done With Care

Basically dangerous jobs, observed Mr. Richardson, usually are performed safely, for the man and his supervisor who execute them then lay out their work carefully. Danger lies in the jobs that are so usual that they are performed without supervision, thought or care, unless standards have been set up. To bring the men to employees' safety meetings nights" have been instituted. Every man who goes to work at the Climax mine, interjected E. H. Denny, district engineer, U. S. Bureau of Mines, receives a rule book and later is subjected to a quiz on the safety rules.

During this spring, said D. J. Parker, district engineer, U. S. Bureau of Mines, speaking for Thomas Allen, chief inspector for Colorado, the State modified its laws to give the State coal-mine inspection department control of mechanical mining, blasting on shift and use of small power or hand-blower fans for face ventilation and underground fans. When coal is to be underground fans. blasted on shift, the chief inspector may not permit any but permissible powder, Cardox, or approved mechanical or chemical devices to be used, and the permissible powder must be fired by electric battery. Only certified shotfirers are allowed to fire such shots.

Each area in which mechanical units are operating, the chief inspector has ruled, shall be under the constant supervision of a properly certified shotfirer or other official other than the regularly employed foreman or assistant foreman. Rubber-covered or properly insulated firing circuits must be used. Burster shots must be fired alone, and no dependent shots are allowed or delay caps used when more than one shot is fired at a time. A sufficient supply of non-combustible dirt or clay cartridges must be kept on hand. Where mechanical devices are used, protection against dust hazards and ventilation shall be provided in accord with an agreement with the chief inspector.

Ventilating fans shall be placed on the intake side of the workings and so set as to exclude return air. All workmen must wear goggles, hard hats and hard-toed shoes. Those operating cutting machines, electric drills or like devices may wear only high-press rubber shoes with hard toes. Only flame safety lamps and electric safety lamps may be used by crews of such units. First-aid kits must be kept close to operating units, and every man be trained in first aid. Telephones must be kept within reasonable distance of the face. Systematic timbering approved by the department is required, and no conveyor or machinery parts may be "suspended from the roof by hooks or bolts inserted in holes drilled for that purpose," without permission of the inspection department.

Six deputy inspectors are provided to supervise the 9,000 coal miners of the State, and every mine employing more than three men underground must be inspected at least twice annually, and all mines employing three men or less, every six months. The Employers' Mutual Insurance Co., insuring only operators having an annual payroll of \$20,000 or more, has two inspectors in the field and a similar arrangement is being attempted to protect operators with

* *

TO CONVERT STRIP MINE

Forty acres of coal land owned by the Wilford Hull estate has been purchased by H. W. Sargent, who operates a strip mine on the Donald Hull farm, near old Bolton, four miles west of Beason, in Mahaska County, Iowa, and across the road from the Hull acreage. The new purchaser says he will take the coal out of the land and then convert the pit into a large lake which he will stock with fish. A creek runs through the center of the land and will be used in forming the lake.

During the stripping operations, says Mr. Sargent, he will build a large dirt dam at the lower end of the farm and will level off the ground to provide an attractive setting for the lake, which will have an area of between 12 and 15 acres.

+

payrolls of less than \$20,000 annually. However, most of the smaller companies are insured under the Colorado State Compensation Insurance plan with at least one inspector. Only one Colorado coal company has its own safety inspector.

Machine runners are not yet certified, but reliable coal companies are requesting that a qualification as shotfirers be required. As by law the face must be examined for methane before shots are fired or electrical machinery operated; machine runners, according to Mr. Allen, should be familiar with the safety lamp and explosive gas. In 1937, legislative effort was made to pass a certification bill for all miners.

A silver wall plaque, known as the "State of Colorado Trophy," is awarded every six months to the mine with the best accident record per man-hours worked. This trophy is retained by the winning team if won four times successively. Fatal accidents are regarded as single accidents because many casualties which are non-fatal might have resulted in death. The contest started January, 1937, and the trophy was awarded to the Ravenwood mine, Walsenburg, on a rating of 50,232 man-hours per accident. Kenneth mine, Rugby, was second with 45,815 man-hours.

Routt County Forges Ahead

Routt County is 100 per cent organized in the Joseph A. Holmes Safety Association and about 1,500 miners are members. One of the larger companies is providing for first-aid training under the Smith-Hughes plan. The Colorado State Vocation Board pays half the cost and the school board, perhaps financed by the company, pays the rest. Ten women's auxiliaries are organized either with the Holmes association or independently, six in County and four in the northern Colorado field. The women are trained in first aid and are prepared to maintain proper quarters and food for rescue workers at mine disasters. W.P.A. workers have filed the maps of the mines and made compresses and triangular bandages. They are now making mine models for instruction pur-The Federal Adult Education Board has agreed to provide fifteen teachers to instruct in arithmetic and other subjects those seeking education in mining.

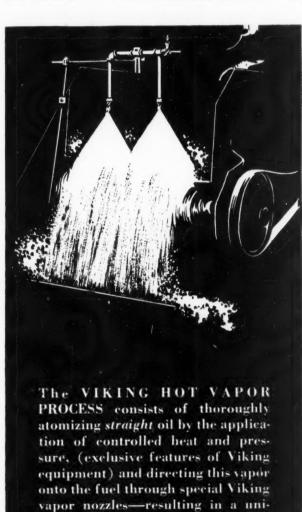
Injuries per thousand men employed has fallen from 132.63 in 1935 to 127.50 in 1936. The improvement is small, but it is believed that the better check on accidents is bringing in many hitherto overlooked.

Some slight progress in accident prevention is being made this year, reported Dan Harrington, chief, health and safety branch, U. S. Bureau of Mines, though an increase from 23 to 53 in the major disaster losses of the first eight months as compared with last year obscures greatly the progress in elimination of single accidents. Gratifying also is the decline in the number of fatalities from falls of coal or roof.

How Zeigler No. 1 mine, which averaged a fatality for every 310,355 tons mined during the 1920-30 period, was able to operate for four years and two days without a fatality underground and hoist 3,084,565 tons in that time was explained by John Lyons, safety engineer, Bell & Zoller Coal & Mining Co., at the panel discussion Oct. 13 presided over by L. C. Campbell, assistant to the vice-president, Koppers Coal Co. A second no-fatality record, continued Mr. Lyons, was started June 14, 1935;



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oil.

up to and including Oct. 5, 1937, the mine had hoisted 2,388,350 tons without a fatal accident. The campaign which made these achievements possible was instituted by Paul Weir, then vice-president of the company, and was opened by a meeting with the miners to explain the objectives of the drive, followed by meetings of foremen to discuss their safety problems. Records like those kept by the Bureau of Mines, detailed reports on each lost-time accident and discussion of methods for preventing a recurrence, and 100 per cent first-aid training also were parts of the program.

Recurrence of accidents, however, rarely happens, stated Mr. Lyons. One that did repeat arose from the practice of riding cutter bars on machines traveling from room to room, and such practice is now forbidden. Two fatal accidents resulted from the breaking of electric locomotive Use of heat-treated alloy steel of 125,000 lb. per square inch in tensile strength and Brinell hardness of 225 has eliminated that breakage, which formerly was a monthly occurrence. Locomotives also are required to keep 200 ft. apart in transit, with only two men on each motor. In face loading, props are never set more than 20 ft. from the face, and while coal is being loaded not less than three safety posts must be set where the coal has been removed. No props must be displaced while machinery is in motion. Steel rods are used for testing the roof.

Men are never disciplined for violations of the safety code. They may be discharged and may be rehired to do work of a less remunerative character, but the offense must be against a duly posted rule and the proof must be unquestionable. In case of violation, the safety department reports the foreman in charge of the violator to the superintendent. Foremen have been suspended, but not mine workers. No general meetings of the workers have been held since the one launching the campaign except for first-aid training, but the bosses hold monthly conferences on safety.

Foremen's Records Checked

Records are kept as to accident frequencies of men under each foreman, continued Mr. Lyons. One boss whose record showed three fatalities and several severe accidents met the demand for an explanation from the mine superintendent with the retort that he "was there to get out He changed his attitude when the superintendent told him that the company laid greater stress on safety than on tonnage and from then had a very favorable accident-prevention record without curtailment of production. Instead of giving bonuses to foremen, as was done at one time, present practice is to declare a "bank day" when the mine operator of when the mine operates five days without accident and award \$5 each to the eight workers holding the lucky numbers drawn on the payoff.

So-called accidents, declared John D. Cooner, safety inspector, Hudson Coal Co., usually occur from lack of foresight. According to that definition, which, he explained. Cadwallader Evans, Jr., vice-president of the company, had tried to drill into the minds of the staff and employees, few accidents really occur. In Hudson terminology, those which could have been foreseen are termed "injuries." Turning to specific methods for decreasing accidents, Mr. Cooner said that safety goggles have been fitted to Comfo safety hats and when

not in use are pushed under two aluminum disks on the under side of the visor. An elastic band around the back of the hat holds them in place. Thus the goggles are immediately available when needed and easily can be put away when not needed.

easily can be put away when not needed.

Auxiliary fans, added Mr. Cooner, are used in caved-ground places and short tunnels which otherwise would be ventilated with difficulty. To avoid recirculation or use of a non-permissible fan, formal application must be made to and approved by the assistant general manager before an auxiliary fan may be installed in a gassy area. If the application is approved, the ventilation inspector is notified and he inspects the installation for approval. This procedure is followed each time a fan is installed or moved, even if only to the adjacent room.

Because roof breaks could not be controlled with wooden props, continued the speaker, steel props were installed in three retreating longwall faces of the Birdseye mine in 1932. The 1-in. bolts through key and wedge, however, would break, allowing both ends of the bolt and the heavy wedges to fly; in one case, despite the fact wedges were tied to the two other



Safety Council Leaders

G. J. BARRETT, secretary, general safety committee, Oliver Iron Mining Co., Duluth, Minn., was elected general chairman of the Mining Section of the National Safety Council at the annual meeting last month. He succeeds C. W. Gibbs, general manager, Harwick Coal & Coke Co., Pittsburgh, Pa.

Lee Long, vice-president, Clinchfield Coal Corporation, Dante, Va., was advanced to the first vice-chairmanship of the section, vice Mr. Barrett. Angus D. Campbell, manager, Omega Gold Mines, Ltd., Larder Lake, Ont., stepped up to second vice-chairman, and L. C. Campbell, assistant to the vice-president, Koppers Coal Co., Pittsburgh, was elected third vice-chairman. Daniel Harrington, chief, safety and health section, U. S. Bureau of Mines, Washington, D. C., was reelected secretary of the section.

Executive committee members at large are: Thomas Allen, chief coal mine inspector, State of Colorado; J. W. Alt, Calumet & Hecla Consolidated Copper Co.; P. M. Arthur, American Zinc Co. of Tennessee; F. E. Bedale, Consolidation Coal Co.; John L. Boardman, Anaconda Copper Mining Co.; M. L. Coulter, Clearfield Bituminous Coal Corporation; C. W. G'bbs, Harwick Coal & Coke Co.; H. T. Harper, Tennessee Copper Co.; H. C. Henrie, Phelps Dodge Corporation; R. N. Hostler, Pennsylvania Compensation Rating and Inspection Bureau; C. J. Keck, Jamison Coal Corporation; Thomas E. Lightfoot, Koppers Coal Co.; William G. Metzger, Hudson Coal Co.; D. D. Moffat, Utah Copper Co.; V. O. Murray, Union Pacific Coal Co.; R. B. Paul, New Jersey Zinc Co.; John T. Ryan, Mine Safety Appliances Co.; L. T. Sicka, St. Joseph Lead Co., and John Treweek, Homestake Mining Co.

parts of the props with ½-in. chains, a wedge weighing 40 lb. flew 23 ft., struck a man in the back and incapacitated him for 18 months. Now 1½-in. bolts are used, the size of the chain has been increased to § in. cross-section, the wedge has been enlarged and the props now are so set that if the wedge should fly it will travel toward the caved area. As shown in Table I, injuries have decreased sharply.

When four men were burned by gas at the beginning of a shift, doubt was thrown on the accuracy of the safety-lamp observation of the fire-boss who carried an electric cap-lamp which he declared he always put in his pocket as he approached a working place. It was thought, explained Mr. Cooner, that the fireboss was blinded by the glare of his lamp and could not see the methane cap distinctly. Now firebosses must use an approved flashlight when traveling over falls, down pitch workings and other difficult places. Tabs are kept on the firebosses' requisitions for new flashlight batteries. As the firebosses were not overburdened with work, they have been able to make their rounds despite the lowered brilliance of the flashlight.

Hudson Coal Co. ranked second in 1934 and third in 1935 in roof-fall injuries in the anthracite region. One boss with 60 men has produced 700,000 tons without fatalities. Comparative figures for 1930 and 1936 are given in Table II.

Table I—Injuries From Failure of Steel Props (Hudson Coal Co.)

	Per Mine	Start	Total	
Year	Injuries	Man- Days	Injuries	Man- Days
1932 1936	$0.200 \\ 0.015$	$0.00 \\ 0.13$	26 3	1,382 28

Table II—Roof-Fall Record (Hudson Coal Co.)

Year	Frequency	Severity	Tons Per Fatality
1930	133.60	6.16	129.121
1936	66.37	4.97	391,386

Goggles were first introduced at the Oliver Iron Mining Co., said G. J. Barrett, secretary of the general safety committee of that company, for use when starting drillholes and breaking chunks. Finally the men themselves made their mines "100 per cent glass goggle from check-in to check-out" whenever atmospheric conditions could be surmounted. Where refraction is needed, the company furnishes the service of an ophthalmologist. Most men also desire side protection for the eyes. After a patient educational campaign, 95 per cent of the workers voluntarily started to wear safety hats and this made it easy to compel the remaining 5 per cent to fall in line. Steel-toed shoes also are in general use and a few safety-toed rubber boots.

Answering J. L. Boardman, safety director, Anaconda Copper Mining Co., Mr. Barrett stated he never had had a refractive lens break. John Treweek, safety director, Homestake Mining Co., declared that he had placed prescription goggles in standard testing equipment and found that they had equal strength with plain goggles.

Accidents have no place in big mines handling large tonnages, observed Richard S. Newlin, mining engineer, Inspiration Copper Co. In many mines steel or timber booms are hung under the caps by boom hangars. After the round is blasted,

(Turn to page 103)

the booms are advanced and the next cap is laid in place on the booms, lagged and collar-braced, before the muck is removed. This protects the muckers or mucking-machine operator. Where timbering or other work is to be done near a trolley wire, the current should be switched off; if that is not possible, the line should be covered with insulation. Only qualified men should be permitted to handle electrical apparatus; power-cable insulations and supports should be inspected periodically. At Inspiration, screen-type goggles are used, but only while breaking rock for the grizzlies.

A cardboard safety shell, patented in 1926 by McLaughlin and Anderson, employees of Commerce Mining & Royalty Co., is now used in all blasting at that company's operations, said H. W. Giessing, safety engineer. The shell is 10½ in. long and 1½ in. in diameter. A wooden core, bored to permit passage of a fuse, is inserted and glued 2½ in. on the end of the shell. A second center hole, which does not completely penetrate the shell, permits the insertion of a spike on the end of a tamping pole. The dynamite is placed in the opposite end of the shell and the end may be turned over to hold it in place.

This shell, explained Mr. Giessing, prevents rupture or destruction of shot and exposure of detonator, which had been the cause of most premature explosions. Over 1,000,000 of these shells have been fired in the past ten years without recorded explosion or injury. The detonator is placed in the shell at the cap rack and need not be exposed in transportation or loading. Dynamite is delivered daily and only about one day's requirements are stored in any mine so that the explosive always will be fresh.

Workers' Interest Maintained

Good housekeeping and maintaining employees' interest in safety are major parts of the accident-prevention program at Homestake, said Mr. Treweek. Many fingers were lost guiding ropes to the tugger hoists until the company devised a mechanical means for holding the rope in place. Because of the hard and sharp rock encountered at Homestake operations rubber shoes and boots must be provided with leather soles and hobnails. Safety bonuses of \$10 are paid to men who work 275 shifts without an accident; a five-year accident-free record brings a \$20 bonus and a like amount is paid for a second five years without a casualty.

Iowa coal mines had more than 8,000 eye injuries, or more than one such injury to each employee, between 1919 and 1932, observed Dr. J. N. Griffin, Bituminous Casualty Co. Not all injuries for which compensation is demanded come from mine accidents. One day, for example, a mine suspended and the next day compensation was asked for 80 hernias; only 16 of the claimants, however, were willing to submit to operation and only one of these was found to have a new hernia. The rest had conditions which proclaimed ruptures of long standing. Many strained backs come not from labor but from infections in nowise attributable to mining.

Cure of men with broken backs which do not cause death, Dr. Griffin added, should be attempted. He had seen and assisted in operating on more than 300 backs where the vertebra was broken in two, with a displacement sufficient to produce paralysis below the point of frac-

ture. When the first shock, lasting about four days, is over, he declared, the bones can be set in apposition and will heal as well as any long bone. Sixty per cent of the 300 cases mentioned had recovered sufficiently for a return to work in 12 to 18 months and about 20 per cent were able to get about and have a return of sensation.

Years of intensive education was required, J. J. Forbes, supervising engineer, U. S. Bureau of Mines, pointed out, to convince the industry that coal dust in the absence of combustible gas is explosive. Still longer was required to win general recognition of the fact that rock dust properly applied would prevent the propagation of coal-dust explosions. How long will it take to effect a substantial reduction in accidents from falls of roofs and sides? Seeing that a 43 per cent reduction in fatalities has been effected in the past five years, it is evident that progress also is being made in the prevention of this type of accident.

Haulage Inquiries

Mining companies utilizing the newer mechanical methods should make definite studies as to possible accidents and employ extra precautions for their avoidance, lest, as already has happened in some instances, the newer systems come into disrepute and be barred by State officials. Despite longer hauls, increased speed and heavier equipment, continued Mr. Forbes, haulage accidents have shown a steady decrease in the past five years. Fatalities from these mishaps dropped from an average of 328 in bituminous mines during the 1926-1930 period to 170 during the last five years. Nevertheless, haulage accidents still are responsible for one-sixth of the fatal and one-fifth of the non-fatal injuries.

Although fires cause less than 1.0 per cent of the deaths and less than 0.1 per cent of the non-fatal injuries in mines, further precautions are in order. In one mine, for example, while the rescue crew fighting a fire had adequate respiratory protection, men bringing in supplies and working on the haulage road on the return air from the fire were left unprotected; as a result, said Mr. Forbes, about fifteen of these men were overcome and nine died before they could be assisted by the rescue squad.

Safety engineers of the Bureau recommend that saws be used wherever possible and that, in general, axes and hatchets not be used underground. Construction and development plans, advised Mr. Forbes, should be submitted to the safety engineer or director of the mine for approval of their safety features before such plans are put into effect.

The plan for shaft sinking first used at the Idaho Maryland mine, Grass Valley, Calif., two years ago is to be followed in sinking a 1,200-ft. shaft of 5½-ft. diameter in the Lake Superior iron ore district this fall, stated a paper by W. D. Haselton, safety supervisor, Pickands, Mather & Co., read by title in his absence by Mr. Campbell. In this system, boring is done with a cutting sleeve riding on chilled cast-iron shot. This sleeve also is the lower extremity of the core barrel. Closely coupled to the core barrel is a cylindrical cab containing the driving mechanism and the operator's compartment, which is prevented from rotating by jackscrews set in the borehole walls.

As only a runner, helper and apprentice, supervised by a foreman, are employed on each shift, there will be few men to be hurt. In sinking the 1,125-ft. Idaho Maryland shaft, said the Haselton paper, only one man was injured—a simple leg frac-ture caused by failure of a metal hook. Swinging shovels and use of drills in close quarters are eliminated. In broken ground, one man does the mucking and the bucket has a bonnet over it which centers it and prevents it from being lowered on the man by mistake. He rides out under the bonnet and in a small rectangular pointed cage above the bucket, being secured by his safety belt and by drop bars over the entrance. The operator sits in an inclosure with a manhole for exit and with the entrance covered by a strong bonnet which has a manhole staggered with the opening in the inclosure. The bonnet is equipped with guide wheels riding on the sides of the hole to prevent spinning. rock or materials are hoisted over the head of the man at the shaft bottom.

In bad ground, difficulties are not as serious as in a rectangular shaft. Reinforced-concrete rings or patches are used with a steel form expanded into place. With hot water and calcium chloride the concrete sets rapidly. No heavy steel shaft sets or lagging have to be installed. Steel guide runners for the permanent cage welded to short plates supported by bolts are leaded into plug holes drilled in the side of the shaft, all templeted to assure alignment. Most of the electric cables are placed behind these plates, where they are protected from damage and contact with the men in the shaft. Brackets extending from runner plates hold the 32-volt cagesignal trolley, and clamps leaded into specially drilled plug holes support water and air lines and cables too large to put behind the runner.

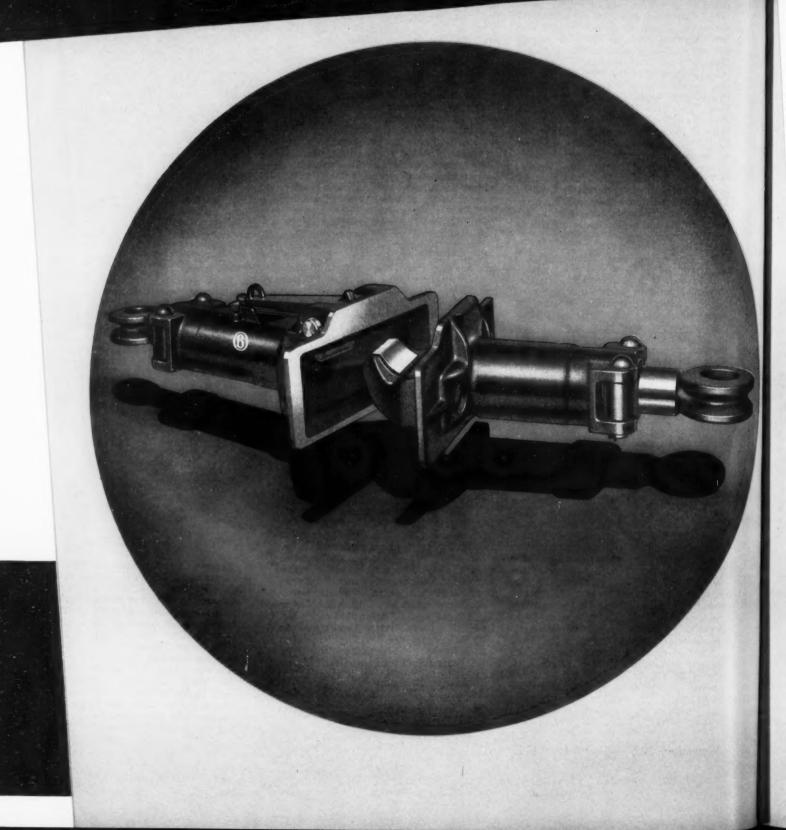
The single workman in the shaft readily is supplied with fresh air through a 1/2-in. rubber hose reeled from the surface. opening is protected by fencing and two In severe weather, headframes boards. In severe weather, headframes can be inclosed to preclude ice and snow hazards and those arising from numbness of fingers of operatives. The isolation of the one man below with a 100-hp. motor, admitted Mr. Haselton, might cause death if a short circuit occurred. A heavy falling object might damage bonnets and make escape difficult. The sinking cage has no safety catches or runners, but a swivel is provided between the top of the cage and the cable, and the cage is prevented from spinning by the rider guiding it either from other hoisting cables or the wall of the shaft.

"Sit-In" Lasts Six Days

Thirty-eight "stay-downers", with whom 7,000 miners of the Lehigh Navigation Coal Co. in the Panther Creek Valley of Pennsylvania went on strike in sympathy, ended a vigil lasting six days on Oct. 11. The men, who were employed on the Eighth level of the Coaldale colliery, Coaldale, Pa., wanted to be paid by yardage instead of at the prevailing flat rate of \$6.78 per day. The men ended their stay-down when Governor Earle submitted to them an agreement he had obtained from Jesse B. Warriner, president of the company.

(Turn to page 106)

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Coal Classification Conflicts and Protests **Delay Action on Minimum Prices**

ASHINGTON, D. C., Oct. 15— Clearing the decks for action on minimum prices under the bituminous coal-control law has turned out to be a tougher job than the optimists predicted. Although hearings to consider both classification standards and minimum prices started here Sept. 27, refusal of the National Bituminous Coal Commission to accept several of the classification proposals in the form submitted to it and operator protests in certain districts against the schedules for their own fields effectively blocked any immediate action on the 30,000 individual prices filed by the 23 district boards. In most cases, however, work on coordination of prices between competing districts made rapid progress, but the agreements so reached must still run the gauntlet of Commission approval and possible objection from individual producers and consumers.

Just when minimum prices will be decided no one in authority here will ven-ture to state. Charles F. Hosford, Jr., ture to state. chairman of the Commission, addressing the National Coal Association at Pittsburgh, Pa., last week, pledged prompt consideration by the Commission, but limited actual commitment to the statement that "every day the time is becoming shorter and shorter before these prices are effective." Few of the difficulties en-countered, he maintained, "have been unexpected; none of them are insurmountable." Like sentiments were voiced by Commissioner Walter H. Maloney in an earlier talk before the West Virginia Coal Mining Institute at Morgantown, W. Va., when he, too, promised early action, but said actual price fixing might be a matter of days or weeks.

Verbal fireworks began the very first day of the hearing when the Commission discovered that a "use" standard had been included in the proposals of District 2 (western Pennsylvania). Emphasizing that the standards prescribed in its order of Aug. 16 (Coal Age, September, 1937, p. 84) were limited to proximate and ultimate analyses, physical characteristics and 'characteristics of performance," Commission rejected the schedule and demanded that it be resubmitted in revised form the following afternoon. "From the first to the last page of your proposed asserted Chairman classification." "you have entirely disregarded the orders and opinion of this Commission.

Kicks Out "Use" Standard

The same ruling was made on standards filed by Districts 4 (Ohio), 7 (Southern low-volatile group) and 8 (Southern high-volatile group). When W. P. Tams, Jr., spokesman for District 7, attempted to explain that the schedule submitted was in accord with legal advice given his board, the chairman cut him short with the declaration that no member of the Commission "considers it the province of any district board on anybody's advice to proceed in defiance of a plain order and explicit opinion of this Commission." In line with its insistence that the classification schedules be wholly free of any taint of price, the Commission later

ordered the withdrawal and revision of the proposals of District 11 (Indiana) because one sheet stated that a certain class of screenings would take the same price

In most cases, the district boards whose classification standards were under attack were able to redraft them to meet the Commission's approval with little difficulty. No such easy path, however, was open to Districts 7 and 10, where the major onslaughts were made not by the Commission but by protesting operators within the districts. Disagreement among



Charles F. Hosford, Jr. Chairman Bituminus Coal Commission

members of the board for District 7 was brought into the open when counsel for the Carter Coal Co. and nine other producers in the Pocahontas field threatened to go "to the Circuit Court of Appeals as soon as possible" if the Commission approved the classification standards before

H. J. Jacobi, vice-president and general counsel, Carter Coal Co., charged that the district board, in violation of the Commission's mandate, had taken N.R.A. marketing experience into account in its groupings and intimated that the board was seeking to reestablish the diversions of tonnage which took place during that period. Questioned by Commissioner C. E. Smith on Sept. 30, Mr. Jacobi stated that certain large contracts for screenings were involved. "If this coal is not properly classified, however little difference in price may ultimately be adopted, we face loss of this large business and the possible closing of our mines because we are not able to sell screenings."

Declaring that very little affirmative evidence of value to the Commission in deciding whether the classification schedules should be accepted had come from any source, Chairman Hosford suggested that further consideration of the District 7 classification be postponed until Oct. 4. Hearing that day was given over to arguments as to what information in possession

of the district board should be made available to the protestants. The next day the hearing was postponed upon representations that there was a chance that the dispute might be settled within the board itself. But when the results of the board's deliberations were presented to the Commission on Oct. 6, W. A. Richards, chairman of the district board's marketing committee, and Major Tams both acknowledged when questioned by Mr. Mr. Jacobi that the changed plan of classification adopted did not change the classification of any mine.

District 7 Settles

Following testimony on a substitute classification proposed by James Walter Carter, president, Carter Coal Co., further hearings were referred to a board of three examiners. After listening to witnesses for the protestants and rebuttal evidence for two days, the examining board adjourned the case until Oct. 11. Yesterday Chairman Hosford announced that, following the recess, the district board had amended its schedule of classification and that all of the protestants against the original proposals had accepted the compromise classification. The district board was ordered to mail copies of its amended plan of classification to all code members in the district with a notice that the hearing would be reconvened next Thursday.

Agreement in the Illinois dispute, however, was still hanging fire this morning. Objections to the classification submitted by the district board were made late last month by spokesmen for the stripping interests, who charged that the schedules filed did not conform with the Commission's orders. Ash and ultimate analyses were among the bones of contention. When protestants first voiced their objections they were asked to confer with the district board members present at the initial Washington hearings. No agreement was reached and the board members returned to Illinois to consider the question further.

Reporting back to the Commission yesterday, George W. Reed, chairman of the board for District 10, stated that since the previous hearing a meeting had been held of the combustion engineers of all the Illinois code members. The majority opinion of that meeting, he testified, was that ultimate analysis could not be used in classifying Illinois coals. A new classification had been proposed and copies thereof mailed to the Commission on Oct. 12. Representatives of the protesting groups, who objected to being designated "protestants" and wanted the record to show that they were "parties interested." insisted that there was nothing in the new schedule to show the formula or basis used for the classification.

Testifying before Examiners W. H. Pelphrey and Allan D. Burk today, Mr. Reed stated that the Commission orders had been strictly complied with in the district classification. After the schedule had been rejected, he continued. Examiner W. H. Crist had accompanied the board members back to Chicago and they had consulted with him frequently in preparing their revised proposals. Reed explained that southern Illinois had been taken as the base classification and that investigations had been made to determine the proper relationship of other (Turn to page 110)

AND BITS HAS PROVED CORRECT'

THE Rachel Mine of the Jones Collieries, Inc., Marion County, West Virginia—closed for two years following a fire which destroyed the surface plant—was brought back into the active list in June 1936. In rebuilding and modernizing the property, the Executives specified only equipment that had proved its dependability by superior performance in their other mines.

We are proud of the part Cincinnati Duplex Chains and Reversible Bits are playing in the restoration of the Rachel Mine and its expansion to new, adjoining coal areas. Mr. E. F. Miller, mine manager, advises that factory-made Duplex Bits have reduced bit cost per ton by over 30%.

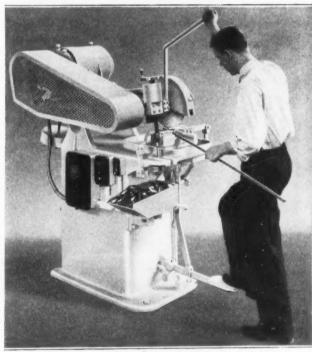
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steam and domestic coals in the State to the coals in the base group. The hearing

will continue tomorrow.

Michigan was the first district to complete its coordination of prices with competing areas. This action was announced on Sept. 29. Three days later the Commission's marketing division declared that only "minor differences as to certain individual markets on certain special kinds of coal" prevented the conclusion of complete coordination agreements for the entire region east of the Mississippi River. This happy state was not reached, however, before there was a show of whip cracking by the administrative body. The two Pennsylvania districts were among the first to incite the Commission's displeasure for their inability to agree and threats were made to remove the members of the district boards. Peace settled down when the boards agreed to accept the decision of the chairman of the Commission's marketing division. Later the Commission threatened to take the question of coordination between Districts 1 (eastern Pennsylvania) and 7 out of the hands of the coal boards and put the decision up to its own examining board.

Failure of District 15 (Missouri, Kansas, Oklahoma and Texas) to file its proposed schedule of minimum prices on time also brought threats of removal of the board membership, but, as in the case of earlier threats, an amicable understanding was reached later. The district was brought into the limelight on Oct. 5 when the members of the board then in Washington were placed under personal subpoena and the board was cited to appear before the Commission the following day to show cause why it should not be moved for neglect of duty. The delay, asserted Commissioner Maloney, holding up "the entire price structure of the mines west of the Mississippi."

Delay Due to Accident

W. C. Shank, chairman, and E. M. Douthat, vice-chairman of the board, explained that price setting in District 15 was an unusually difficult task because of the keen competition with oil and gas in that area. The schedules; added Mr. Douthat, would have been in Washington had not a mail plane from Kansas City been grounded by bad weather. The schedules were submitted to the Commission Oct. 9. when the Commission withdrew its subpoena and thanked the members of the board for their cooperation and aid. district marketing committee was named to carry on the work of coordination with competing districts.

Proposed classifications submitted by the board for District 12 (Iowa) on Sept. 29 were found to be in conformity with the Commission's requirements. On the preceding day, however, the board petitioned for assignment to a price area arate from No. 2, which also includes western Kentucky, Illinois and Indiana, contending that the tentative cost of production set by the Commission was too low for successful operation. A hearing set for Sept. 30 was continued until a later date, the board being permitted, meantime, to file its own proposed minimum prices, which were taken "only as an indication as to the minimum prices the petitioner desires to through coordination." have established

That unregulated markets for bituminous coal within Pennsylvania would have

a direct effect upon interstate commerce in other States, was brought out in a hearing at Johnstown, Pa., which ended on Sept. 23. Fifty-eight witnesses were heard, including an official of the United Mine Workers, small truck miners, representatives of the largest producers in the two Pennsylvania fields, West Virginia and Ohio, freight agents of coal-carrying roads, and two prominent economists. agreed that there was definite need for federal regulation and insisted that it would be impossible to permit some coals of the State to be regulated by the Commission as to price and to allow others to be unregulated. Robert W. Knox, acting general solicitor for the Commission, said it had been established that in all of the markets in which interstate and intrastate coal meet there is active competition and that Pennsylvania coals directly affect interstate coals in such markets.

The difficult task of reconciling the hitherto widely divergent views of east and west Kentucky producers was tackled with a will at a hearing held at Lexington, Ky., beginning Oct. 4, under the direction of W. H. Pelphrey, senior examiner. All of the witnesses, including producers, retailers and statisticians from Kentucky. Tennessee, Ohio and Indiana, contended that it would be impracticable for the Commission to try to regulate one portion of Kentucky coal and allow any to go unregulated as to price and marketing

rules.

Truckers Here to Stay

The steady rise of tonnage sold by truck mines in Kentucky since 1923 was shown by an increase of 100.2 per cent in twelve years. Ninety-five per cent of the wagon-mine producers in District 9 (West Kentucky) are members of the code, said W. W. Crick, Madisonville. He added that members of the Kentucky Wagon and Truck Mine Association produce about 700,000 tons annually, a considerable portion of which is trucked to Tennessee and southern Indiana. James W. Bristow, executive vice-president, Illinois Reciprocal Trade Association, warned the industry that truck mines continually increasing in number and tonnage and were here to stay.

Regulation or More Mines

A brief hearing on the nature and extent of intrastate commerce in bituminous coal in North Carolina, was held before Examiner C. A. Newcomb, on Oct. 13, at Raleigh, N. C. H. J. Bryson, State Raleigh, N. C. H. J. Bryson, State Geologist, said that if North Carolina coal was not regulated as to price by the Commission, development of the Deep River field in Lee, Chatham and Moore counties undoubtedly would be launched, and the The field operation would prove profitable. not being worked at present because of high production costs. Modern mining equipment, said Mr. Bryson, would be installed to cut production costs 30 to 50 per cent. Intrastate freight rates to consuming areas, he added, favored local pro-

W. W. Addis, assistant traffic manager of the Harlan County Coal Operators' Association, declared that producers of District 8 (Southern No. 2) sold a considerable tonnage in North Carolina and felt that this tonnage would be placed at a serious disadvantage if the State's coal were not placed under regulation.

Others arguing for regulation included William L. Beasley, Island Creek Coal Co., and E. G. Cook, Consolidation Coal Co., who testified that though little North Carolina coal was sold, they believed that if regulation was not imposed there would be an increase in the development of mines in the State and that coal sold in interstate commerce would be adversely affected.

A searching investigation of the intrastate coal situation in Tennessee was conducted by Charles O. Fowler, principal examiner for the Commission, on Oct. 13 and 14 at Knoxville. A new need for regulation of Tennessee coal was expressed by L. C. Gunter, executive vice-president, Southern Appalachian Coal Operators' Association, who said that through such action consumers would be protected by being assured of a higher quality of coal of honest weight. He added that the entire membership of his association favored regulation of the State's coal output by the Commission, believing that only through such action can the industry be saved.

Supporting Mr. Gunter's dictum was A. . Fisher, Southern Coal & Coke Co., which handles the entire output of three mines in Tennessee and nine mines in Kentucky. He declared that competition be-tween Kentucky and Tennessee coal was keen and constant. Benefits of regulation, other producer witnesses were unanimous in stating, would not only assist in stabilizing the industry but would extend to workers in the mines, to consumers and to persons engaged in suppying coal companies with equipment or who depend upon the purchases of mine workers for business. These, as well as retailers and producers from other States, agreed that it would be wholly impracticable for the Commission to permit Tennessee coal to escape regulation either as to price or market

Results Worth the Effort

James M. Daniels, general sales manager, Stearns Coal & Lumber Co., said the "difference between what the consumer pays under the old system and what he will pay under the regulated system is negligible as compared with the results to be gained by having an industry as big as the coal industry in a position to purchase the products he may be engaged in making himself. A stabilized price such as is proposed by the coal act will not be to the disadvantage of the consumer in the long run."

Testifying along similar lines, W. Sullivan, vice-president, Grider Coal Sales Agency, Birmingham, Ala., said that if the Commission were to leave unregulated a substantial portion of the Tennessee market it would give the Tennessee producer a very real advantage. He pointed out that such a shipper could use the unregulated market as a convenient spot into which he could dump his surplus sizes of coal; it would be possible, Mr. Sullivan said, for the shipper to make various concessions to dispose of excess sizes. could slash the price on screenings and dispose of them quickly; "then his tracks would be clear and he could go after business in the regulated market, where his coal would move interstate or be in competition with interstate commerce in coal." Alabama producers, selling only in the regulated market, he added, would be unable to dump surplus sizes in this manner. and, as a result, it would be necessary for

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them to curtail production or suspend op-

erations at their mines.

Colonel Weeks, director of the Southern Tennessee Coal Operators' Associa-tion, which is composed of 27 members who produce 95 per cent of the tonnage in western Tennessee, said that history would repeat itself if the Commission allowed any portion of the State's coal output to be sold without regulation. He predicted that producers in such unregulated area would commit economic suicide by cutting prices below the cost of production. But with stabilized prices such as are proposed by the Commission, he said, consumers of both domestic and industrial coal would ulti-mately benefit rather than suffer from regulation.

Conditional Conditional approval as marketing agencies was granted by the Commission on Sept. 22 to Alabama Coals, Inc.; Birmingham, Ala.; Appalachian Coals, Inc., Cincinnati, Ohio, and the Smokeless Coal Corporation, New York. Similar applications by the Raleigh Smokeless Fuel Co., Beckley, W. Va.; Peale, Peacock & Kerr, Inc., New York; Rochester & Pittsburgh Coal Co., Indiana, Pa., and the Minter Fuel Co., Beckley W. Va., were denied. approval

were denied

In a formal opinion released by the Commission on Oct. 13 the Beach Bottom mine of the Wheeling Steel Corporation, at Beach Bottom, W. Va., was granted exemption from Sec. 4 of the Guffy-Vinson act as a captive producer. At the same time, applications for exemption of the Harmar mine of the Consumers' Coal Co. and Freeburne mine of the Emperor Coal Co., subsidiaries of the Wheeling Corporation, were denied.

Evidence and arguments in the protest of the Progressive Miners against the appointment of Ray Edmundson to the producers' board of District 10 (Illinois) will be heard by the Commission on Oct. 21. Mr. Edmundson is district president of the United Mine Workers and the Progressives, led by Joseph Ozanic, challenged his appointment on the ground that the Lewis organization did not represent a majority

of Illinois miners.

Safety Award to Summit Mine

Officials and employees of the Alta Coal Co.'s Summit mine, at Sumiton, Ala., have been awarded a certificate of honor by the Joseph A. Holmes Safety Association for "an extraordinary safety record." Frank E. Cash, district engineer, U. S. Bureau of Mines, who announced the award, said the mine had operated more than eleven years—Sept. 1, 1925, to Dec. 31, 1936— without a fatal accident. During that per-iod a total of 1,103,823 tons of coal was produced with 3,834,961 man-hours of

Perfects Boiler-Burner Unit

An automatic stokerless boiler, invented V. M. Cruikshank, Sunbury, Pa., is being widely distributed after being on the local market for five years. The unit embodies straight-line construction with the coal hopper having an outlet directly over the automatic burner within the shell of a special steel boiler, the burner in turn being placed directly above the ash receptacle. Included is an automatic self-cleaning rotary burner and water-backed patented spiral fuel pusher, both under thermostatic control for both heat and hot

Approved by the Anthracite Industries Laboratory, the IMP automatic boiler is manufactured by the Cruikshank Utilities, Sunbury, Pa.

Evans Colliery Leased

The Evans Colliery, near Beaver Meadows, Carbon County, Pennsylvania, has been leased by Herman Bane, of Pottsville, who operates the Red Ash Coal Co., Plymouth, Pa. Workmen were promptly put to work to make the plant ready for the resumption of operations.

How to Use New River Coal

Firing instructions and heating hints for guidance in the use of New River coals have been issued by the New River Coal Operators' Association. The firing instructions are printed on a card to be hung near the heating plant, telling how to start the fire, how to add coal, how to bank and warning against stirring and unnecessary poking of the fire. Heating hints are contained in a handy four-page leaflet. Both pieces carry a diagram of a furnace showing how a fire should be maintained and giving directions for the adjustment of dampers, fire door, draft door, etc.

Jones Employees Join U.M.W.

The Jones Brothers Coal Mining Co., with mines at Marissa and Tilden, Ill., has signed an agreement with the United Mine Workers, according to an announcement on Oct. 7 by Erwin Hartenstein, district representative of the Lewis union. He said twothirds of the employees had voted to join a U.M.W. local and had received a charter. A month previous, when Mr. Hartenstein reported that a majority of the workers had voted to desert the Progressive Miners for the Lewis organization, the report was contradicted by Drexel Collins, district representative of the Progressives.

Pagnotti Leases Breaker

No. 1 breaker of the Pittston Co., at Dunmore, Pa., has been leased by Louis Pagnotti, president Sullivan Trail Coal Co. Preparation of coal mined at various shafts of the No. 9 colliery, at Pittston, also leased by Mr. Pagnotti, is to be tranferred from the Barnum breaker, at Duryea, to the No. 1 breaker.

Mulga Mine Blast Kills 34

Thirty-three men lost their lives and another was fatally injured in an explossion which wrecked Sec. 13 in the Mulga mine of the Woodward Iron Co., Mulga, Ala., in the evening of Oct. 15. Of the dead, thirteen were white and twenty were negroes. The mine is a shaft opening to the Pratt seam, which is reached at a depth of 226 ft., the levels branching out from the foot of the shaft over a wide territory; the location of the disaster was about 4½ miles from the bottom of the An official investigation of the cause of the disaster was begun immediately by W. B. Hillhouse, chief of the Alabama Mining Department, and Frank E. Cash, resident engineer, U. S. Bureau of

Operating Questions Dominate Program Of West Virginia Institute

LABOR RELATIONS, electric power for mechanical mining, safety, preparation and shaft heating in winter were the major topics on the program of the 30th annual meeting of the West Virginia Coal Mining Institute, held Oct. 1 at Morgantown. History and geology had their innings in a paper on the Pocahontas coal field. Promise of minimum prices, "perhaps in weeks or days," was made by Commissioner Walter H. Maloney, of the National Bituminous Coal Commission, pinch-hitting for Chairman Hosford at the banquet held jointly with the Coal Conference on Combustion sponsored jointly by the Institute and the West Virginia University (see p. 92 of this issue)

Success of relations between employer on the other party. The preferable alter-

and employee depends upon justice and the hope of the future rests on a determination to do away with violence in these relations, declared M. P. Cooper, division general superintendent, Hillman Coal & Coke Co., Pittsburgh, Pa. Mr. Cooper Coke Co., Pittsburgh, Pa. Mr. Cooper criticized the use of the term "collective bargaining" because, he said, it implies trying to impose the best bargain possible native is a continuous study which will provide means of adjusting the wages to the proper balance with living costs and other pertinent factors.

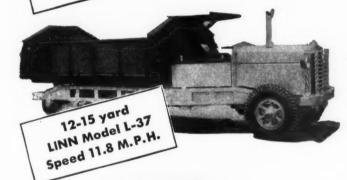
Extension of the practice of employing only men who pass physical examinations may lead to a situation where every employer must follow suit if he is to avoid hiring men with physical defects. mately it may mean some provision for caring for the physically unfit. Caring for the aged is a step in the right direction, but as to whether it should be done through some form of insurance or by the government Mr. Cooper left as an open question. By reason of the changes in methods of mining the operator is confronted with obtaining a new type of foreman. Instead of being only or principally an efficient director of men he must understand machinery and all of the new problems its use entails.

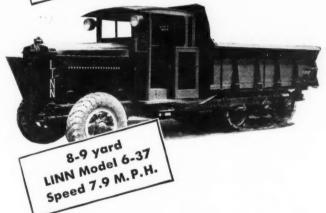
W. E. E. Koepler, secretary, the Pocahontas Operators' Association, expressed his satisfaction in announcing an accomplishment whereby in the Pocahontas field every labor disagreement has been settled at the mine or locally without a concilia-tion board hearing. The effect is more satisfactory to both parties and the expense of hearings is saved.

Calling attention to the fact that this year marks the fiftieth anniversary of the first commercial application of electricity to coal mining in this country, Edwards, associate editor, Coal Age, said

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In a classification of the electrical systems of 24 otherwise modern mechanized operations only twelve were given a "satisfactory" rating, and only three or four were mentioned as being beyond reasonable criticism. Further analysis showed that in ten of the satisfactory cases a "convinced" attitude of the management was responsible for the good conditions. Larger feeders and substations kept closer to loads are the principal weapons being used to fight the low-voltage parasite which mechanical mining is helping to crowd out after fifty years "Insulate to suit the conditions of boring. and maintain a feeder system which does not choke flow" were set forth as the two simple rules for dealing with the inflexible ways of electricity.

Measured by fatality figure comparisons, the end of 1937 should show a 55 per cent safety improvement over 1928 at Consolidation Coal Co. mines, stated F. E. Bedale, safety director, who presented a complete picture of the company's activities since 1927, when a comprehensive department of safety was organized. After a depression cessation of safety department activities an initial improvement record of 79 per cent dropped to 30 per cent before the activi-

ties were resumed.

Cost Returned in Two Years

Physical examination, careful investigation, classification and study of all accidents, work instruction, a model working place, safety meetings, first aid, competence examinations for motormen, machine operators and foremen, and a set of operating rules are the principal instruments of improvement. The operating rules, which were formulated in 1927 and revised in 1929, are now undergoing a second revision. In the study of accident records and the making of recommendations therefrom great care is exercised in trying to draw a line between false assumptions and proper precautions. Only a safety man thoroughly familiar with mining is competent to investigate and classify an accident so that the primary cause is determined.

Adam Crawford, safety engineer, Mallory Coal Co., Logan County, said he could take no exception to the thorough way in which the Consolidation Coal Co. tries to arrive at a means of better control of accidents. Men moving from high-coal to low-coal mines and men suffering from outside influences such as domestic difficulties were mentioned as deserving of special attention

in accident prevention.

More attention should be paid to the complete job rather than concentrating attention on the mechanical cleaner itself was the theme developed in a talk by J. B. Morrow, preparation manager, Pittsburgh Coal Co. Often the auxiliaries are more expensive than the primary cleaning unit. Because most consumer kicks are more a matter of variation than quality it would be well to spend more money on mixing or blending and perhaps less to the end of trying to obtain that last ½ or 1 per cent in ash reduction.

Claiming no prejudice, as indicated by his company operating both wet and dry processes, Mr. Morrow said the dry process is satisfactory down to a certain size and rate and that the wet process is more satisfactory beyond that point but is much more expensive. The cost to clean fines by the wet process may be three or four times the cost of cleaning the larger sizes. He is not much in sympathy with cleaning down to gravities such as 1.35 or 1.37½ because it may be a very expensive proposition, since the waste of mine output, for example, may amount to as much as 4 per cent in order to secure a reduction to 6 per cent ash instead of to 7 per cent ash.

Higher labor cost will force the use of more mechanical cleaning. Even now the cost of taking rock by hand is higher in some cases than it would be by machine, and in one case installation of a mechanical cleaner actually reduced the preparation cost. In selecting a unit it must be remembered that for any type there is a size range where it will work best and the harder the job the lower the capacity. In a complete new preparation plant built as a unit, the cost of the mechanical cleaner itself may not exceed 8 per cent of the total investment. Mr. Morrow emphasized that "clean coal" is not a definite term. Just what is clean coal must first be de-cided upon for the particular job or for intelligent discussion.

Operating savings in the first two years' use paid for the shaft heating installation at Pond Creek Pocahontas Co., Bartley, W. Va., said F. C. Carothers, general superintendent, who described this job, installed in 1934 and using Aerofin steam radiator units to heat the downcast air. Both the skip hoisting shaft and the manand-supply compartment of the auxiliary shaft were so equipped and an existing boiler plant formerly used to drive a fan engine supplies the steam (Coal Age, July,

1935, p. 289). In a paper, on "The Pocahontas Field and Its Development." Roland C. Luther, assistant general manager, Peerless Coal & Coke Co., Vivian, W. Va., included also the geology, a history of preparation and labor relations. The field, comprising an area of 300 square miles underlaid with Pocahontas No. 3 seam ranging for the most part between 5 and 8 ft. in thickness, first attracted attention in 1840 but it was not until 1880 that a complete survey revealed the true value. The first mine was opened in 1883 at Pocahontas, Va., and the first washer, a Christ jig, was installed in 1903. At present, according to Mr. Luther, 99.8 per cent of the mines are fully electri-96.9 per cent of the tipples are equipped with shaker screens and loading booms, and 67.8 per cent of the tonnage is washed or air cleaned.

washed or air cleaned.

Uniformity of quality—not over 1 to 2 per cent variation in any item of proximate analysis—and dependability of supply

have worked to the advantage of Pocahontas coal. There has never been a long shutdown in the field. Only two mild cessations have been experienced, one in 1902 and the other in 1895. With the present labor relations it is a matter of pride that all disputes that have arisen so far have been settled locally. As to sales, the Pocahontas field has the most concentrated policy of any section: that is, most of the

large sales agencies are financially tied with the operating companies.

The retiring president, N. P. Rhinehart, chief of the West Virginia Department of Mines, presided at the meetings. Carel Robinson, general manager of the Keilys Creek Colliery Co., was advanced from first vice-president to president. F. F. Jorgensen was stepped up to first vice-president and D. L. Brown was elected a vice-president. Other vice-presidents are George Caldwell, C. W. Connor and W. J. German. C. E. Lawall was reelected secretary-treasurer.

Coal vs. Oil, Pyrite and Guffey Law Discussed at Urbana Conference

THAT the costliness of oil offsets its convenience, while coal stokers are almost as convenient and just as cleanly and the use of coal is more healthful and safer, that pyrite rescued from mine refuse can be sold at a profit, how coal is selected for use in small stokers and how the Guffey Act may save an industry from the prince-and-pauper conditions hitherto existing, formed the meat of discussions at coal sessions of the Fifth Annual Illinois Mineral Industries Conference, held on Oct. 8 and 9, at the University of Illinois, Urbana, Ill.

Invention no longer is a hit-or-miss improvisation made without any preliminary studies, but the outcome of carefully planned and executed research, asserted Clyde E. Williams, director, Battelle Memorial Institute, Columbus, Ohio, at the opening all-industries session. Fundamental research is the finding of facts regardless of their possible practical application, whereas practical research applies fundamental knowledge to effect a useful result and, for the most part, is aimed at the solution of a commercial problem.

Until recently, most fundamental investigation and pioneering practical studies were undertaken by non-commercial agencies, but today progressive industrial organizations are engaged in fundamental as well as in practical commercial research.

Recovery and briquetting of fines, cleaning of coal, extraction of pyrite, combus-tion of solid fuel, smoke and fly-ash elimination, deterioration of coal by weathering or oxidation, coking of coals normally lacking in coking characteristics, chemical uses for coal, gas generation and liquefaction of coals were possible studies indicated by Dr. Williams. Greater efficiency in coal combustion will aid that fuel in competing with gas and oil and permit of higher prices. Liquefaction as a prospective use of coal is a "long, long way off," yet rate of discovery of oil is now less than rate of production, and coal may have to be liquefied to render the peculiar services which oil is now performing for our modern civilization.

Oil burners first became important factors in domestic heating about the time of the World War, recalled W. Y. Wild-



ALL AMERICAN CABLE DIVISION ROPES MADE OF IMPROVED PLOW STEEL ARE IDENTIFIED BY THE EMERALD STRAND

man, managing director, Illinois Coal Traffic Bureau, at the afternoon coal session, with M. F. Peltier, vice-president, Peabody Coal Co., in the chair. Intensive advertising and selling drives made them increasingly popular, especially during the boom years. Reductions in price and improvement in design aided their inroads on the coal market. As a result, one out of every fourteen houses in the country is now being heated with oil. Assuming an average coal consumption of 12 tons to the home, the domestic oil burner displaces over 14,000,000 tons of coal or coke. Heating-oil consumption in Illinois alone in 1935 displaced 2,081,000 tons of Illinois coal. At first the effect on Illinois production was slight, as oils replaced mostly anthracite and coke, but now liquid fuel is eating into the bituminous tonnage.

Stokers Show Gains

Improvements in the small domestic stoker in the last few years, however, have taken the country by storm. oil burners formerly outsold coal stokers 10 to 1, the ratio now is $2\frac{1}{2}$ to 1. Oil and coal are about equally dependable, and also equally cleanly when stoker-fired, continued Mr. Wildman. Modern stoker coal is dustless when treated and burns practically without smoke. Even in convenience, oil has little advantage over stokerconsumed coal, particularly in a stoker of bin-feed type. As regards noise, there is little difference, with the balance perhaps in favor of coal. In economy, coal is far in front of oil. Southern Illinois stoker coal averages 12,000 B.t.u. to the pound; at \$6.30 per ton, this is 38,100 B.t.u. per penny delivered. Ordinary No. 2 fuel oil gives about 140,000 B.t.u. per gallon, or 20,000 B.t.u. for a cent. With the efficiency of coal burned in a modern domestic stoker equal to that of oil in a conversion burner, the cost of heating a house in Chicago with the latter is 90 per cent greater than with stoker-fired southern Illinois

Furthermore, said Mr. Wildman, a coal furnace is safer. Health considerations also favor coal because of its more even temperature. It is, therefore, convenience against economy with oil costing \$83 per year more. An increasing number of people believe the added convenience is not worth that much, and many stoker installations are replacing the older type of conversion oil burner. Improved stoker design and the lowering of initial installation cost arising from volume production may increase stoker sales.

Every oil-burner salesman, alleged Mr. Wildman, emphasizes heat insulation of the home when selling a burner, so that the increased cost to the householder due to the use of oil can be reduced. Coal men should do the same, for, if the house is well insulated, the purchaser of a stoker will be better satisfied with his investment. The oil-burner salesman urges the purchaser to insulate his tank, but the heat thus escaping warms cellar and house and thus is not lost.

Forty million tons of coal has been deducted from the nation's coal requirements by the railroads' cut in use of coal from 160 lb. per 1,000 ton-miles gross in 1920 to 122 lb. in 1932, and a further deduction of 42,000,000 tons by the reduction made by the utilities companies in the use of coal from 3.75 lb. to 1.3 lb. per kilowatthour. This 82,000,000 tons equals the

combined annual production of Illinois, Missouri, Kansas and Arkansas.

In the firepot, declared S. A. Dickson, "Alton R.R., the fine sizes go to the outside of the pot and the large coal to the inside. As a result, the air rate is unequal. Top size in stoker coal, said Mr. Wildman, should not exceed 1 in. Some prefer even a smaller top size. Size uniformity is important, added T. J. Thomas, president, Valier Coal Co.

No one, not even the operator, realizes the importance of the coal industry, asserted Walter H. Maloney, National Bituminous Coal Commission. Our coal, we are told, will last 5,000 years, but the good grades of coal will be depleted in 300 years, and the high-grade coals in 100 years, after which industry will face increased costs. Moreover, the Western reserves which have most of the coal are far from the markets. Metallurgical coals of West Virginia are 11 per cent depleted, and when they are gone, the steel and all industry will be handicapped. Thus have coal operators wasted the treasure house of industry. Every year 250,000,000 tons is lost by bad mining methods; at least 150,000,000 tons beyond repair. The nation will soon be in a state of economic starvation in a poorhouse of its own making.

Preservation of capital, wages and coal with protection of the consumer is the purpose of the Commission, Mr. Maloney asserted. The losses of life in the mines are staggering and 71 non-fatals occur to every fatal. The Commission hopes to restore prosperity, and with it will come improved accident rates. The only relieving feature in this picture is the United Mine Workers. John L. Lewis had declared that the present conditions must not continue; the Guffey bill must be passed or he would close down the industry.

The law and the Commission, asserted Mr. Maloney, was a gift of government to industry. Research is greatly needed and the Commission will provide it as soon as it has its hands free from the burden of getting its administrative work on an operating basis. Have faith in the Commission, your government and the people, he cried. The railroads feared the Interstate Commerce Commission, but now everyone trusts it. Why not trust the Coal Commission?

The speaker had complained of inequit-



PERMISSIBLE PLATES ISSUED

FOUR approvals of permissible equipment were issued by the U. S. Bureau of Mines in September, as follows:

Jeffrey Manufacturing Co.: Type 29-U arcwall mining machine; 50-hp. motor, 250-500 volts, d.c.; Approvals 326 and 326A; Sept. 10.

Goodman Manufacturing Co.: Type 924-EJ slabbing machine; 50-hp. motor, 250 volts, d.c.; Approval 327; Sept. 13.

Stewart R. Browne Manufacturing Co.: Tuffite flashlight; Approval 606; Sept. 18.

Goodman Manufacturing Co.: Type 85-A pit-car loader; 3-hp. motor, 230 volts, d.c.; Approval 328; Sept. 25.

in the Interstate Commerce Commission. Why not try to decrease the automobile fatality rate, which is as great every year as that of the coal industry in 35 years, asked Mr. Peltier. Exception was taken by R. D. Hall, engineering editor, Coal Age, to the statement that waste should be eliminated in coal so that it would be preserved to take up oil's burdens when oil plays out. Oil, he said, has a 90 per cent wastage and coal only 50 per cent, while metallurgical coal is being mined almost without waste.

able coal freights and someone asked if

that showed the confidence of the coal board

Petrographic	Analysis Illinois		x	48-Mesh
	In	Coal Bed		Washed
Vitrain		19.0		4.8

	In Coal Bed	Washed
Vitrain	 19.0	4.8
		51.9
Fusain		2.6
Refuse	 6.6	4.7
	100.0	64.0

Blocks of coal as they come from the mine, declared L. C. McCabe, associate geologist, Illinois Geological Survey, are covered with fusain—positive proof that it is the weakest member of the four components of coal and the principal cause of degradation. Sometimes one or both surfaces parallel to the bedding planes may be covered by the next weakest member—vitrain. Clarain is stronger than vitrain, and durain is toughest and most resistant of all, but it is of little importance quantitatively, as clarain, vitrain and fusain together probably constitute over 99 per cent of the combustible portion of Illinois coals. The table shows these relationships.

Most Fusain in Screenings

Most of the fusain goes to the screenings, and, if these are dedusted, it will be found in the dust. The 3x2-in. egg may have some of the small vitrain, but it is mostly clarain. No. 2 nut $(2x1\frac{1}{4}$ -in.) is still rich in clarain. In most coals No. 3 nut $(1\frac{1}{4}x^2$ -in.) is 8 to 10 per cent higher in vitrain than the bed from which it is mined. Vitrain continues to concentrate below 48-mesh in most instances until the 100- or 200-mesh size is reached. Below this usually the fusain is highly concentrated.

Differences of several hundred degrees in fusion points of ash from vitrain and clarain have been reported. Resistance to grinding decreases with weakness and should be considered when coal is to be pulverized for firing. Vitrain swells abnormally when heated. Studies show that it is concentrated in the stoker sizes. Egg and large nut sizes, relatively high in free-burning clarain, might be crushed and mixed with normal stoker sizes or, at some mines, the broken product of the larger sizes might desirably be sold unmixed with other fractions as a special stoker fuel.

In motion pictures, which Dr. McCabe exhibited, coke-tree development was marked when high-vitrain coal was being burned and blowholes formed in the coal bed. Fuel high in clarain showed a bed free from coke trees and relatively free from blowholes. Coke from vitrain will crevice badly as soon as the temperature is reduced. Clarain coke which has not swelled so much is more coherent on cooling. Fusain will not coke at all. The

Wire Rope and Strand now products of Bethlehem



WITH the recently-announced acquisition of Williamsport Wire Rope Company by Bethlehem Steel Company, Bethlehem becomes a manufacturer of wire rope and strand.

For years the name Williamsport has been identified with dependable wire rope and strand. Not only to men who have been using Williamsport products, but to all other wire rope and strand users, Bethlehem's entry into this field marks an important forward step.

As Williamsport Wire Rope becomes Bethlehem Wire Rope, customers of Williamsport Wire Rope Company can look with assurance to Bethlehem to maintain the quality standards associated with Williamsport products. Advantages to the user may naturally be expected to accrue from the broader manufacturing and servicing facilities offered by the Bethlehem organization.

Customers of Bethlehem Steel Company can now obtain a complete line of wire rope and strand from the same source which furnishes their other steel requirements, and made to the same quality standards as those that govern in the manufacture of Bethlehem alloy and tool steels, plates, sheets, and other products.

Wherever and however you use wire rope and strand you will find Bethlehem a source of well-made, dependable material, serviced by men whose long, first-hand experience in analyzing and solving wire-rope problems is a background for authoritative recommendations on the most suitable grade of Bethlehem Wire Rope for any task.

BETHLEHEM STEEL COMPANY

fusain content of the bed runs from 0.8 per cent in Montgomery County to 7.43 per cent in the coal of St. Clair County.

Illinois ½-in.x10-mesh coal, remarked Dr. Williams, gave excellent results in the domestic stoker, but ½-x½-in. needed to have some of its finer sizes removed. Unfortunately, with too wide a range of sizes the user generally segregated the several sizes in handling and undid the mixing work done at the mines. Ash should not be too fusible nor too infusible for best stoker action.

Illinois coal would make domestic coke but has too much sulphur for use as a metallurgical product, stated Dr. McCabe. More Illinois coke must be used to make a ton of iron than coke made from Eastern coals. Too many dealers, declared Mr. Dickson, mix fines in the yard, for the fusion temperature of the ash in the mixture may be lower than that of the ash of either coal alone. With ten sizes of coal, there will be ten qualities of fuel. The acid-alkaline balance of the ash in coal changes with the size and also with the cleaning.

Tests made for the United States Steel Corporation at the Engineering Experiment Station, in which coal was mixed with iron ore and coked, gave good results, said another. A high content of iron ore, however, spoiled the product. Coke can be made with unmixed Illinois coals, but a little Eastern coal will improve the characteristics.

Courts Disregard Charts

With the Ringelmann chart method of density of smoke measurement, five grades are established, the smoke being rated as No. 1, or 20 per cent; No. 2, or 40 per cent; No. 3, or 60 per cent; No. 4, or 80 per cent, and No. 5, or 100 per cent dense, recapitulated Oscar Monnett, consulting engineer, Commercial Testing & Engineering Co. But no courts will pay any attention to the Ringlemann charts. To obtain a conviction, the visibility of objects behind the smoke cloud or the light of the sky as seen through the smoke must be attested.

Smoke from railroad operation in the Chicago district used to rate as 49 per cent, and now it is less than 6 per cent. With return tubular boilers for marine service using Illinois coal, overfeed sprinkler types of stoker are preferable. Mr. Monnett declared he had burned as much as 60 lb. of coal per square foot of grate area per hour with this type of iurnace and did it smokelessly.

Unfortunately, industrial stokers must always be suited to the particular coals for which they are built. One cannot operate a stoker adapted for eastern Kentucky coal successfully with Illinois coal. Under most laws no denser smoke than No. 3 may be made, and such smoke is limited to 6 minutes in any one hour. This gives opportunity for cleaning fires once an hour; although seldom done that frequently, but this arrangement gives the owner some leeway.

Illinois coal, declared Mr. Monnett, may be classed as a free-burning, medium- to high-ash fuel, according to the field from which it comes; this coal is well suited to chain grates, of which Illinois may be said to be the home. Natural-draft, front-feed, side-feed and gravity-feed stokers, semistokers and furnaces are using satisfactorily Illinois coals from widely separated

fields and of varying ash content. Lowgrade high-ash coals of this State are not so well adapted to underfeed, but with overfeed the very lowest quality Illinois coals can be burned. Underfeed stokers do well on coal with 7 to 10 per cent ash. With the overfeed the high temperature of the bed at points about 15 in. above the grate gives smokeless combustion. On the grate can be found coal reduced to fixed carbon and burning at a relatively low temperature.

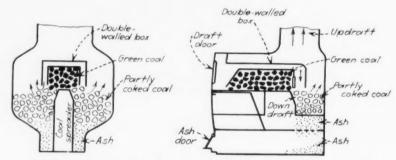
Unless stack diameter exceeds 5 ft., it will not militate against the value of Ringelmann-chart observations. If the shaft should be 20 ft. in diameter, size would become an important factor; however, only Boston has given this fact consideration in its specifications. Looking away from the sun increases the reading, and if the wind blows toward the observer, the density of the smoke will appear to be increased.

of the smoke will appear to be increased. Automobile fumes are more detrimental to health, declared Mr. Thomas, than smoke. Traffic officers, added Mr. Monnett, are so affected by the gases from automobile exhausts that they are relieved every four hours. With domestic furnaces,

these means the gases of incomplete combustion from the raw coal are passed down through incandescent carbon and burned with sufficient air to prevent the formation of smoke. The coal is pushed into the rear of the box with a poker. The experiments are being made with the aid of the Binkley Coal Co.

Disposal of tipple waste is a major problem of the operator, asserted D. R. Mitchell, associate professor, speaking for himself and C. M. Smith, research assistant professor. Some companies pay the railroads 8 to 25c, per ton for the removal of this waste, which includes picking-table refuse, cleaning-plant reject and material gobbed underground. Some crush the rejects and clean them for the market, and some use them in their power plants. Some mines are recovering pyrite and marcasite by jigs and concentrating tables, and one is even using froth flotation. Material other than pyrite might be used for the manufacture of heat-insulating material, rock wool or for ceramic purposes. Gas and oil byproducts could be obtained from such waste.

Four plants in the Mid-west, declared



Plan of down-draft burner for existing up-draft boiler furnaces

he continued, the coking or the alternate system gives the best results, especially when a hot blast pipe admits air over the center of the furnace near the coal surface. In the first system, the front of the fire is pushed back and the space filled with coal, and in the second system coal is alternately fired in the front or the back of the furnace. With this alternate system, which is good because of all good systems it is simplest and easiest to induce people to follow, it is possible to restrict domestic fires to the emission of only No. 1 smoke. Unless a smokeless coal is introduced, the small stove and small heating unit probably will never be smokeless because of the indifference and lack of training of the user.

A new down-draft burner for use in existing up-draft boiler furnaces or stoves was described by J. R. Fellows, associate in mechanical engineering of the university. It has an inverted double-walled box suspended from the firing neck of the furnace with the open side down and is prevented from spilling by the clogging action of coal being carbonized and burned on the grate below. As this coal is reduced to ash and shrinks, more raw coal leaves the inverted A cone-shaped spreader under the mouth of the box and also suspended from the firing neck maintains the coals from a previous charge at the correct level for smokeless operation. Increasing the ash bed or extending downward the walls of the box will promote the same effect. By

Dr. Mitchell, are preparing pyrite and marcasite for the manufacture of sulphuric acid. Plants buying this material require that it contain no more than 5 per cent carbon and some are trying to obtain a product with only 3 per cent. Sulphur should run 45 per cent. Some will take ferric sulphite of any size, but flash plants require minus 100-mesh material. One sulphuric-acid manufacturer will accept sulphide at 20-mesh and finer. Presence of arsenopyrite is objectionable, and probably acid manufacturers would bar pyrite containing it. Prices range from \$3 to \$4 per ton. Coal pyrite has to compete with brimstone, with imported pyrite from Spain and with products from copper smelteries.

Results of a survey to determine the factors entering into consumer selection of domestic stoker coals, presented by K. C. Richmond, editor, Coal-Heat, at the West Virginia Conference on Coal Combustion (see page 92, this issue), were also given by the author at Urbana. Factor No. 2—that the coal can be burned with minimum attention—Mr. Richmond admitted, covers generally low ash content, clinkering characteristics, coking tendencies, quantity of fuel required, frequency and quantity of clinker to be removed and the way the coal burns or holds fire in early fall or late spring.

Greater size standardization, he continued, is desirable. Certain it is that 1½-in. material should never be present; with it the stoker is noisy, segregation of sizes

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is inevitable and heat emission accordingly irregular. Split \$\frac{1}{16}\$-in. sizes are mere selling points entirely without merit, but quality is most desirable and better results are obtainable with special stoker sizes than with screenings. About 40 per cent of the homes have such poor furnaces, such wretched heat distribution and so many leaks that the dealer does not want to install stokers in them, for it will ruin his reputation. The average home is 34 years old, and its heating equipment is obsolete. About 150,000 stokers will be sold in the present year.

The quantity of fuel oil used in domestic heating rose from 40,000,000 bbl. in 1932 to 90,000,000 bbl. in 1936, and it is expected to reach about 105,000,000 bbl. in the present year. Proportionately this is more than the rise in crude petroleum output and also more than the increased consumption of gasoline during this same period, asserted W. H. Voskuil, mineral economist, Illinois State Geological Survey, at the oil-and-gas session, Oct. 8. A continued rise in heating-oil demand comparable to the past will threaten the adequacy of the supply. The oil industry may find that it must forego part of its heating-oil market or possibly devise oil burners that will use the heavier residual oils.

Industrial Notes

LINCOLN ELECTRIC Co., Cleveland, Ohio, has appointed W. R. Persons as manager of its Pittsburgh (Pa.) office. He has been connected with that office three years.

F. M. Maichle, has been made manager of the Detroit (Mich.) office. He formerly was manager of the Pittsburgh (Pa.) office.

LINK-BELT Co. has elected William C. Carter and Edward J. Burnell as vice-presidents. Mr. Carter, a graduate of the University of Illinois, joined the Chicago plant in 1902 as a draftsman and Mr. Burnell, a Lehigh University graduate, joined the Philadelphia (Pa.) organization in the same capacity in 1913.

ROBINSON WELDING SUPPLY Co., a new organization located at 1921 East Ferry St., Detroit, Mich., has been formed by J. M. Robinson, who for the last twelve years has been Detroit manager for the Lincoln Electric Co.

CUTLER-HAMMER, INC., Milwaukee, Wis., has appointed A. R. Johnson as manager of its merchandising sales division, in charge of all distributor activity. Elmer F. Weiss succeeds him as manager of the Detroit office.

Sullivan Machinery Co. has appointed Alexander W. Limont, Jr., as manager of its compressor division at Michigan City, Ind. He was formerly connected with the Norwalk Iron Works, Norwalk, Conn., as chief engineer and later with the Ingersoll-Rand Co.

United States Rubber Products, Inc., has appointed Frederick D. Benz as district manager of wire sales, Pacific division, with headquarters at San Francisco, Calif. Heretofore he has been manager of wire sales at the company's Chicago office.

BABCOCK & WILCOX TUBE Co. has named Edward D. Emerson as New York

manager of domestic and export sales. He formerly was with the Jones & Laughlin Steel Corporation and Air Reduction Sales Co.

New Departure, division of General Motors Corporation, has selected Frank J. Miller as manager of its Chicago sales and engineering office, 230 North Michigan Ave. He has been associated with the company's sales activities in Chicago territory for eighteen years.

Union Wire Rope Corporation, Kansas City, Mo., has appointed Lester G. Schraub as sales manager, effective Oct. 15. He has had 23 years' experience in the wire-rope business, having for the last nine years been manager of sales for the wire division of the Sheffield Steel Corporation.

BETHLEHEM STEEL Co. has acquired the properties and business of the Williamsport Wire Rope Co., with plants at Williamsport, Pa., and Sparrows Point, Md. Charles M. Ballard, formerly vice-president in charge of sales of the Williamsport company, has been appointed manager of sales, Wire Rope and Strand Products Division, with offices at Bethlehem, Pa.

Coal-Mine Fatality Rate Shows Improvement

Accidents in coal mines of the United States caused the deaths of 85 bituminous and 10 anthracite miners in August last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With production totaling 33,665,000 tons, the death rate among bituminous miners was 2.52 per million tons, compared with 2.69 in the preceding month, when 31,610,000 tons was produced, and 2.96 in August, 1936, when output was 33,086,000 tons.

The anthracite fatality rate in August last was 3.87 per million tons, based on a production of 2,584,000 tons, as against 4.51 in the preceding month, with an output of 2,661,000 tons, and 6.85 in August, 1936, in mining 3,503,000 tons.

For the two industries combined, the death rate in August last was 2.62, showing a slight decline from the preceding month's figure, which was 2.80, and from that for August, 1936, which was 3.13.

Fatalities during August last, by causes and States, as well as comparative rates for the first eight months of 1936 and 1937, by causes, are given in the accompanying tables.

COAL MINE FATALITIES, AUGUST, 1937, BY CAUSES AND STATES

4,	_			-Und	lergi	ound	l		-	_		-Sur	face-		
State	Falls of roof	Falls of face	Haulage	Gas or dust explosions	Explosives	Electricity	Other machinery	Other causes	Total underground	Mine cars	Machinery	Electricity	Other causes	Total surface	Grand total
Alabama	1		1						2						2
Colorado	1	-	1					-	2						2
Illinois	3		1						4				1	1	5
Indiana	1						1		2						2
Iowa	1								1						1
Kentucky	8		5					1	14				1	1	15
Maryland	2								2						2
New Mexico	1					1			2						2
Ohio	3		2			•			5		1		^ ^	1	6
Oklahoma			_	1					1		*			_	1
Pennsylvania (bit.)	8	2	5						15	^ *					15
Tennessee	2								2						2
Virginia	_		1	1			1	1	4						4
West Virginia	12	1	8		1	2	-	-	24						24
Wyoming	:	10,6.						1	1		1			1	2
Total (bituminous)	43	3	24	2	1	3	2	3	81	-	2		2	4	85
Pennsylvania (anthracite)	7	1							8	1		1		2	10
Grand Total	50	4	24	2	1	3	2	3	89	1	2	1	2	6	95

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES* January-August, 1936 and 1937

/		-Bitu	ımınous-			An	thracite-				Total-	
	Nun	ber	Killed	per	Nun	aber	Killed	per	Nun	ber	Killed	per
	Kill	led	Million	Tons	Kil	led	Million	Tons	Kill	led	Million	Tons
Cause	1936	1937	1936	1937	1936	1937	1936	1937	1936	1937	1936	1937
Falls of roof and coal	375	356	1.410	1.238	93	87	2.514	2.650	468	443	1.545	1.383
Haulage	111	149	.417	.518	15	19	.406	.579	126	168	.416	.524
Gas or dust explosions:												
Local explosions	14	10	.053	.035	11		.297		25	10	.082	.031
Major explosions	8	47	.030	.163	5		.135		13	47	.043	147
Explosives	15	19	.056	.066	12	9	.324	.274	27	28	.089	.087
Electricity	22	35	.083	.122	6	2	.162	.061	28	37	.092	1111
Mining machines	11	10	.041	.035					11	10	.036	.031
Other machinery	8	5	.030	.017	2	1	.054	.030	10	6	.033	:019
Miscellaneous:												
Minor accidents	26	23	.098	.080	16	7	.430	.213	142	30	.139	.094
Major accidents	9		.034	****					9		.030	
Shaft	6	11	.023	.038	7	3	.189	.091	13	14	.043	.044
Open-cut mining	7	5	.026	.017	5	5	.135	.152	12	10	.040	.031
Surface	22	42	.083	.146	11	13	.297	.396	33	55	.109	.172
Grand total	634	712	2.384	2.475	183	146	4.946	4.446	817	858	2.697	2.677

* All figures subject to revision.

WHAT'S NEW

In Coal-Mining Equipment

MINE-CAR COUPLER

Increased safety and efficiency in coupling mine cars are cited as the two most important advantages of the new O-B automatic mine-car couplers offered by the Ohio Brass Co., Mansfield, Ohio. Made of high-grade cast steel, the coupler bodies are provided with heavy draft springs to absorb coupling shocks and insure smooth operation of trips.

The coupling operation, according to the company, is completely automatic, so that trips may be made up by simply bumping the cars together. It is not necessary for a man to step or reach between the cars when either coupling or uncoupling. As the coupler heads come together, a spring-actuated cam on the female head engages a recess in the male head. Uncoupling is accomplished by merely raising a lever at the top of the car, which in turn releases the cam.

When conditions so require, it is stated, the couplers can be set in unlocked position so as to kick cars from dumps without performing their automatic coupling operation. Also, the

couplers are made so that they will rotate and therefore can be used in rotary dumps without upcoupling. When uncoupled, the couplers always are held in longitudinal center alignment by means of a combination spring-suspension and centering device. The width of the heads provides sufficient gathering range so that coupling can be accomplished automatically on short-radius curves without adjustment of any of the parts.

Trips made up with these couplers, according to the company, become practically rigid units from end to end with the exception of the travel permitted by the draft springs, thus relieving shock in motion and reducing maintenance expense. In the event of a derailment, this rigidity also is said to prevent telescoping or riding of one car over another.

The tendency of the couplers at all times is to keep the trip in proper tandem alignment whether on or off the track, it is pointed out. Other features noted by the maker include: less loss of load and cleaner tracks as a result of the smooth riding which accompanies tight

coupling and the cushioning effect of the draft springs; less chance of derailment on curves because the point of engagement is back of the bumper and near the center of the car; and less strain on motor equipment as a result of smooth trip operation and practical elimination of slack between cars in starting as a result of rigid connections.



Ingersoll-Rand Co., New York City, has added the DA-30 drifter drill to its line of drilling equipment. In the 125lb. class, the new unit is said to be ideal for many mining operations, such as small drifts,

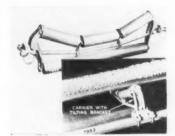


tunnels and stopes. A new double-opening air valve is said to increase drilling speed greatly without increasing air consumption.

BELT CARRIER

Stephens-Adamson Mfg. Co., Aurora, Ill., offers a new lightweight ball-bearing belt-conveyor carrier in which the lightweight rigid truss-type frame is supported on two parallel pipes instead of the conventional structural-steel or timber stringers. Carrier brackets are clamped to the pipes without boring holes, and carriers, it is stated, can be shifted whenever necessary. By using standard piping, a light, strong conveyor frame can be assembled quickly and inexpensively from materials available anywhere, the company points out.

A special rocker-type mounting permits the carrier to tilt in either direction with the travel of the belt. In this way, it is asserted, even a reversible belt can be centered on the carriers without the use of guide rollers. Permanently sealed



cartridge-type Fafnir ball bearings are used to increase bearing life and reduce maintenance costs. The unit is available in two styles, one consisting of the three-roll carrier only and the other of both carrier and return roller in one light, easily mounted assembly. Special ball-bearing head, take-up and countershaft pillow blocks also are available for use with these carriers and can be mounted on the same pipe frames.

OILER

A constant-level oiler bearing the name "Levomatic" is announced by the Trico Fuse Mfg. Co., Milwaukee, Wis. This line of oilers, according to the company, is designed primarily for low-cost applications on small bearings, automatically maintaining an accurate level of oil in ring and ball bearings of motors, line shafts, pumps and other machinery having oil wells. As oil is consumed, it is replaced automatically with fresh oil from the reservoir. No attention is required after installation, it is stated, except for periodically refilling the reservoir.

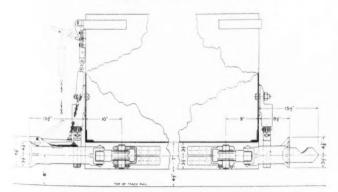
MINING STARTER

To meet the needs of the mining industry, General Electric Co., Schenectady, N. Y., offers the CR4061-C1B heavyduty direct-current starter, described as a compact, long-lived unit providing two-point acceleration for constant-speed motors, shunt- or compound-wound, rated at 1 to 20 hp. in voltages up to 600. Some of the features are thermal and instantaneous overload protection, an externally operated line switch capable of interrupting





Couplers about to engage showing manner of engagement on curves



Typical O-B automatic-coupler installation

load, a field-adjustment rheostat to compensate for line variations, and adaptability to correct operation on line fluctuations of 150 to 300 or 325 to 600 volts. Sudden large overloads are guarded against by the overload, or "jam," relay, while the thermal overload relay protects the motor against continuous small overloads that might heat and damage the insulation. Compensation for small voltage variations is provided by the field-adjustment rheostat. A non-ventilated cadmium-plated inclosing case protects the starter mechanism from dust, moisture and corro-

V-BELT FASTENERS

Flexible Steel Lacing Co., Chicago, offers a new fastener for joining "C-section" V-belts of the fabric-core cross-weave type. The fastener, according to the company, makes practi-cable the installation, shortening or replacement of V-belts on the job without delays or tearing down expensive installations.



Features include a double rocker pin supported in bronze bushings and a method of holding the end plate to the belt end without materially weakening the belt or bulging its sides.

---LINESTARTERS

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., oflow-voltage Type DNO totally oil-immersed linestarters (illustrated) for explosion-proof and corrosion-resisting services. The combination starters provide in one oil tank complete a corrosion-resisting motor control, motor-disconnect switch and circuit-protective de-Weatherproof, drip-proof, splashproof, dust-tight construction with cast-iron top casting and heavy sheet-steel tank with gasketed joint features these linestarters, which are designed for wall or frame mounting with tapped holes for conduits on top. Ends and back of the top casting also may be tapped for conduits.

Overload protection is provided by two thermal-induction oil - immersed automatic - reset overload relays, low-voltage protection by a three-wire pushbutton control, and the breaker handle is interlocked with the tank so that the latter cannot be lowered unless the breaker handle is in the "off" position. Furthermore, the breaker can-



not be closed with the tank lowered unless the interlock is deliberately tripped. In addition to the breaker and starter combination unit, there also is available a combination unit with non-automatic disconnect switch and a plain starter with-

out disconnect.

High-voltage DNO starters are available in ratings of 2,200 and 4,600 volts for starting squirrel-cage and wound-rotor motors. For three-pole 60-, 50-, 40- or 25-cycle power, maximum ratings are 700 hp., 2,200 volts, and 1,250 hp., 4,600 volts. The starter is available for floor mounting, in which case access may be had by removing the cover, disconnecting the leads and shifting the internal assembly out of the tank, or with a structural mounting frame which supports the unit off the floor and provides for lowering the tank. The starter is operated by a special twobutton oil-immersed pushbutton station and the internal assembly consists essentially of the main switch with its operating mechanism and auxiliaries, an operating transformer, current transformers and overload re-Weatherproof construction permits mounting the starters outdoors, and their high capacity, it is stated, results in their being sufficient protection for feeder circuits without feeder circuit breakers.

PROSPECTING DRILL

Bucyrus-Erie Co., South Milwaukee, Wis., offers the new Bucyrus-Armstrong 23-P placer-prospecting drill, which it describes as compact, modern, all welded, all steel, light in weight and easily transported. Pipe driving and pipe-pulling are provided for by a special spudding beam with two positions for the pitman connection, one for driving and the other for pulling. Although comparatively light, the new drilling unit, according to the company, swings a heavy string of tools for high-speed drilling. Easy control of all drilling operations, geared hoist, worm feed on the bull reel, all-steel derrick with eight-point pipe bracing, rubber shock absorber for effective use of steel line and wheel or truck mounting are other features cited for the

COUPLING

Lovejoy Flexible Coupling Co., Chicago, offers "L-R Type WQ" flexible couplings in standard sizes with bores from 1½ to 14 in. (2 to 2,000 hp. at 100 r.p.m.). A feature of this coupling pointed out by the company is a provision for independent rotation of either half of the coupling for engine timing, etc., without removing load cushions or steel retaining band. Three types of cushions are used: "Metalflex" (high-grade long-wearing brake-lining material for heavy shock loads and severe service), leather (sustained loads and greater misalignment) and "Multiflex" (rubber-duck fabric vulcanized under pressure for use where wide load fluctuations are encountered and maximum resiliency is desired).

--PIPE THREADER

Beaver Pipe Tools, Inc.. Warren, Ohio, offers the new No. 48-R semi-adjustable taperpost-type pipe threader, using a separate set of dies for each size, for threading 2½-, 3-, 3½and 4-in. pipe. Cutting right-



hand tapered threads (American Briggs standard), the threader, according to the company, is distinguished by an extra-wide die with a wide throat to center and hold the tool on the pipe, fully inclosed "straddle-mounted" driving pinion to reduce repair bills, a fully inclosed springbacked ball to hold the dies in position and a shoulder on the tapered post to mark the proper position for setting dies to cut a "standard" thread. Weight of the threader is 58 lb.

COATINGS

Harrington Paint Co., Inc., East Cleveland, Ohio, offers the new "Galvide" coating, which it describes as giving perfect adhesion to galvanized iron without acid etching or other special processing in advance. "Galvide" also is said to provide protection against inorganic acids and alkalies.

Another new Harrington product is "Rust-eeter No. 100," a rust-conversion primer said to give absolute protection against further oxidation and which does not require that the surface to which it is to be applied be clean of rust. This product also is said to protect against inorganic acids and al-

_____ V-BELT

Goodyear Tire & Rubber Co., Akron, Ohio, announces the "E-C Cord" multi-V-belt, which it characterizes as the closest-matched multiple-V drive belt yet achieved. Precision-built, the close matching of the belts, it is pointed out, equalizes the strain and load-carrying burden on all the belts of the assembly, prolongs their life and produces a better and more efficient drive. The load on the new belt is carried entirely by a layer of heavy, low-stretch high-tensile cords placed in a neutral area between rubber high-tension and high-compression sections. Surface wear is taken by an elastic fabric envelope with a bias weave.

--COMMUNICATION AID

Webster Electric Co., Racine, Wis., offers the Model 105 "Teletalk" loud-speaker intercommunication system for use in offices, factories, etc., where intercommunication between one central station and one to five remote points is desired, either as a group or selectively. system consists of one master station, which is selective and which controls the direction of the conversation and originates the call to the remote station or stations, which can answer the master station only when called. No communication between the speaker units is pos-

---COMPRESSOR

Fairbanks, Morse & Chicago, offers a new dieselpowered air compressor described as a completely selfcontained unit with various types of portable mountings.



These mountings are: wooden skid, steel-wheel, rubber-tired wheel, spring-trailer, motortruck and two-wheeled springtrailer. Shipping weight, depending upon the type of mounting, varies from 5,830 to 6,930 Air delivery at a pressure of 100 lb. per square inch is 210 c.f.m.

COAL.

SEVENTEENTH ANNUAL MODEL MINING ISSUE • DECEMBER 1937

COAL AGE

Featuring the Operations of the BELL & ZOLLER COAL COMPANY

CONTENTS

Volume 42

Number 12

BELL & ZOLLER COAL COMPANY

Foreword	Power Generation
Historical 77	Ventilation
Mining Methods and	Pumping and Drainage115
Mechanical Loading 79	Safety117
Transportation	Maintenance125
Zeigler Preparation 94	Supply Service
Electrification	Merchandising
Operating Ideas 139	Word from the Field 149



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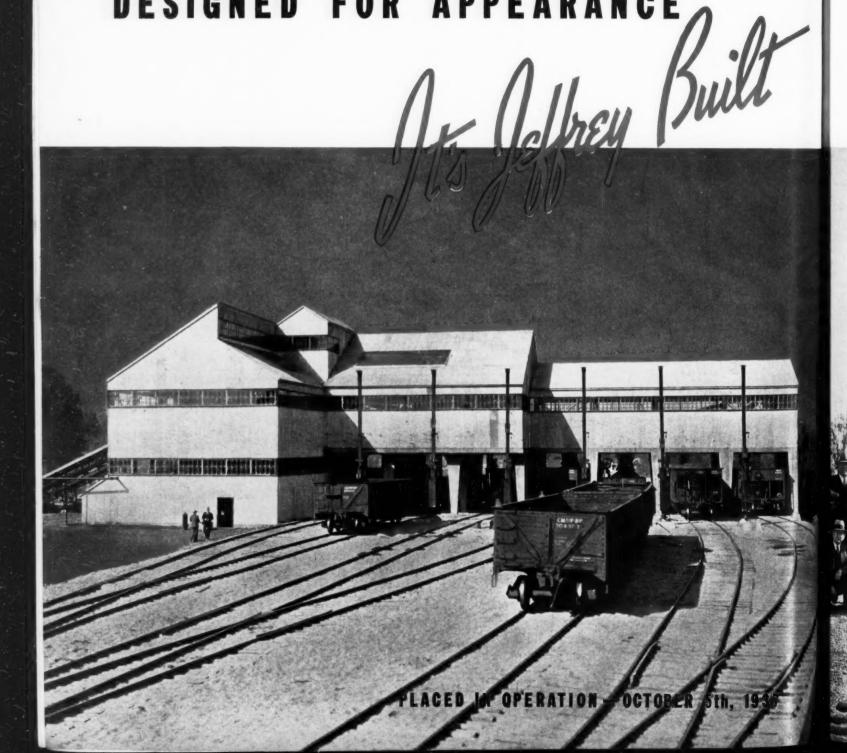
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THEY'RE LOADING COAL IN AMERICA'S FINEST AND

ENGINEERED FOR UTILITY DESIGNED FOR APPEARANCE



AT HICKORY GROVE MOST MODERN WASHERY

Pleasing to the eye . . . practical in lines . . . economical of space and materials . . . equipped for performance . . . a good place to work in — this new 300 T.P.H. washery began operation on October 5th, as America's finest example of today's modern industrial design in coal preparation plant construction.

When the Hickory Grove Coal Mining Corporation laid plans for erection of this plant at Jasonville, Ind., they wanted a modern-looking and modern-performing plant. They also wanted trouble-free, fireproof construction . . . light, ventilation, accessibility and safety. They wanted a modern plant IN-SIDE and OUT. They got it because Jeffrey built it.

THE JEFFREY MANUFACTURING CO.



O-B EQUIPPED

O-B overhead trolley and feeder materials, and locomotive equipment aid tonnage flow at Bell and Zoller.

MINE AGAIN WINS AWARD

B

MODERNITY is the keynote of the Bell and Zoller Model mine operations at Ziegler! Completely electrified and mechanized—no finer example of modern mining can be found in the world today.

13,500 tons of coal per day are whisked to the surface at these two mines—13,500 tons of coal flowing continuously from face to tipple—continuously dependent on properly functioning materials and equipment.

A tremendous responsibility faces the management of such a property. Operation must be completely trouble-free. Costs must be carefully analyzed. Production must meet pre-determined schedules. *No wonder that Bell and Zoller specify* O-B overhead materials, locomotive equipment, safety and control devices! Years of experience have proven the wisdom of relying on O-B dependability—O-B economy—O-B longevity.

1958M

OHIO BRASS COMPANY

MANSFIELD . . . OHIO CANADIAN OHIO BRASS COMPANY, LTD. NIAGARA FALLS . . . ONTARIO, CANADA



SPECIFY O-B AND YOU SPECIFY DEPENDABILITY

"OUR CARS RUN



TEXACO

MORE EASILY"



THE CRESTED BUTTE COAL COMPANY

PRODUCERS AND WHOLESALERS OF

"RUSTY COAL"

DENVER, COLO.

of our lubrication work on mine car wheels.

Your lubricant seems to be admirably suited to this use, as we find our cars run more easily and also our trips run faster and reduce the mishaps which we were previously troubled with.

THE CRESTED BUTTE COAL COMPANY was experiencing difficulty due to journal bearing trouble. Draw-bar pulls were unduly heavy.

Switching to Olympian 00 Mine Car Grease, they soon found starting easier despite the severe winters, and, as their letter says, "reduced the mishaps we were previously troubled with."

This company's mine superintendent found that even in frigid weather, Olympian is easy to get into the gun and into the bearings. Trained lubrication engineers are available for consultation on the selection and application of Texaco Mine Lubricants. Prompt deliveries assured through 2070 warehouse plants throughout the U. S. Start using Olympian today. See how it improves your haulage system.

公 公 公

The Texas Company, 135 East 42nd Street, New York City.



OLYMPIAN MINE CAR GREASE

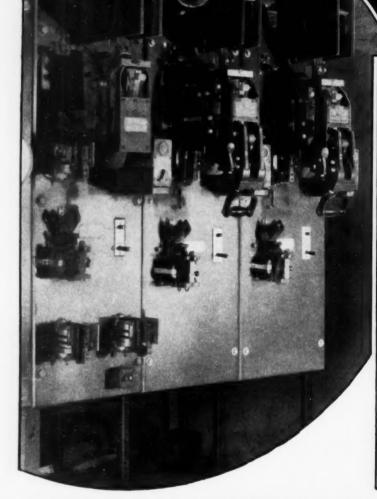
... At the MECHANIZED MINES

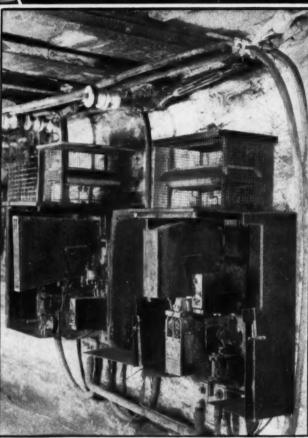
of

BELL & ZOLLER

ir

Southern Illinois





AUTOMATIC RECLOSING CIRCUIT BREAKERS

Bell & Zoller use type KSA Switchboard Circuit Breakers in substations and Type KSC Sectionalizing Circuit Breakers in mechanized sections. Choice of Automatic Reclosing Circuit Breakers for substation or sectionalizing service is based on definite advantages. May we send you I-T-E Bulletins outlining the value of Automatic Reclosing equipment installed in many of the industry's leading operations?

List of I-T-E Circuit Breaker Company Bulletins dealing with the advantages of sectionalizing with Automatic Reclosing Circuit Breakers:

137 . . . Sectionalizing Circuit Breakers Reduce Costs at Oakwood Mine.

437 . . . Lowering Power Demand Charges at a Large Pennsylvania Mine.

 The Advantages of Sectionalizing Power by Use of Automatic Circuit Breakers.

Representatives in Principal Mining Areas



I-T-E CIRCUIT BREAKER CO., PHILADELPHIA, PA.

THAT'S WHAT IT TAKES AND
THAT'S WHAT YOU HAVE WITH



NEW SULLIVAN

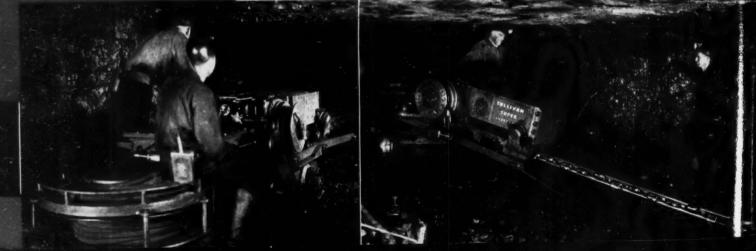
COAL CUTTERS

500more

SULLIVAN 7-B

FOR THICKS







MODERN - MORE POWERFUL

Economically produced
Honestly priced

Designed (not merely altered or rebuilt) to meet the demand of Modern Mechanization Programs. Their modern construction complies with United States Bureau of Mines requirements and thus bear United States Bureau of Mines Approval Plates at no extra cost. Both the machines and their trucks are tested proven equipment with capacities equal to that of modern loading machines. Their slightly higher price is more than justified by the hundreds of thousands of coal cut tons and greater dependability built into them.

SULLIVANIZE TO MODERNIZE MODERNIZE TO ECONOMIZE

SULLIVAN MACHINERY COMPANY Claremont, New Hampshire

KSEAMS

ODERN COAL CUTS

ON SISB

The Sullivan "Super" Shortwal for thick seams is a super-powerer coal cutter possessing many new features of construction that make it the fastest of all Shortwall coal

7AU

the first successful, adjustable floortype, top cutter with ranges to suit every seam.

8B

Because Sullivan's 7-AU Track Cutter has been acclaimed the world's fastest us track cutter, these machines are rapidly replacing older types of coal cutters.

6B

Sullivan, realizing the need of a single machine capable of performing the duties of either a shortwall or a longwall machine, built the 3-B Dual Duty.

The Sullivan Low Vern Track Cutter has made available the economies of track cutting to the thin seam operator.

The Suddivan "Master" Shortwall is a low built, high powered, coal cutter for thin seems embodying many new and outstanding features to be found in no other low vein shortwall.

10B

The newly improved Sullivan CLE-5 Longwall Coal Cutter occupies a position of leadership throughout the longwall mining areas

The "Big Buddy" Medium Duty Coal Cutter...
The one and only high grade, small sized, inexpensive

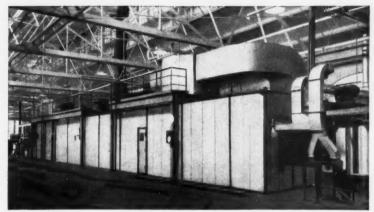


The "Buddy" Coal Cutter ... Roonomics, practical and compact ... Designed to fill the requirements of the small domestic produces ...

CLE

C He White bar Short

NEW Machine Makes G-E Cable



This new machine produces 44,000 yards of 36-inch varnish-impregnated cloth in a 5-day week. That is about 1,500,000 yards of 1-inch tape.

The cloth goes through three complete coating and baking cycles. For each, it passes through the oven 16 times.

Inside, the temperature and humidity of the air remain constant—regardless of the atmosphere. The varnish is continuously circulated in a closed system; it is kept clean by straining, and the specific gravity and viscosity are always the same. Result: a uniform product.

MORE Uniform, Stable, and Long-lived

This new machine (at the left) varnish-impregnates cloth for use on G-E insulated cable. It speeds up production; but, at the same time, it controls so accurately the impregnating process that the cloth is uniform throughout its length. Result: cable insulated with this cloth has excellent electrical characteristics and will retain them for years.

In the manufacture, G. E. controls every step of the process—from the raw cloth, the special varnishes, to the finished cable. Some of these steps are illustrated.



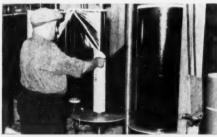
 This raw cloth is made to G-E specifications; and containing little sizing, it readily absorbs the varnish.



2. Cloth starts on its long journey through the 90-foot oven. Here the first coating of varnish goes on.



 Inside of oven, showing overhead track on which cloth runs. Air blown down dries the cloth uniformly.



 Cloth is taken off here and put through the oven twice more. That's to make sure the cloth is thoroughly impregnated with varnish.



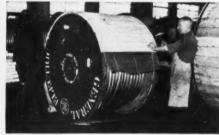
5. Next the cloth is sliced into strips varying in width from $\frac{3}{2}$ inch to $2\frac{1}{2}$ inches.



6. Then it is applied on conductor: two layers; then flushed with compound; then two more layers.



7. Then braid (shown in picture), lead, armor, or other protective finish is put on.



8. And here is the finished cable being readied for shipment.

THESE shots are, of course, just the highlights of an interesting story. More details are given in Bulletin GEA-2623, which contains complete information on all types of cloth-insulated cable. For a copy address the nearest G-E sales office, or General Electric, Dept. 6C-201, Schenectady, N. Y.

GENERAL ELECTRIC

AT BELL & ZOLLER ...

THEY JUST ALZ PRODUCTION

* PACEMAKERS OF MECHANIZED MINING

Your best profit opportunities in mechanized mining come from "high-balling" . . . from speed gained by balancing, timing and combining various units into a unified tonnage-getting system. Machine delays upset that system, load up costs, wipe out those best profit opportunities of yours.

This places heavy responsibility on CUTTING and HAULAGE units, which are the pacemakers of productive work. In addition, there is the responsibility for safety to which ventilating fans contribute the vital share.

That the "model mines" of The Bell & Zoller Coal Mining Co. and its affiliated companies have consistently relied on Jeffrey . . . for cutting, haulage and ventilation . . . is a fact so significant that it needs no further explanation —

THE JEFFREY MANUFACTURING COMPANY

COLUMBUS. OHIO

JEFFREY COAL MINING EQUIPMENT

WITH JEFFREY EQUIPMENT

THEY RELY ON JEFFREY

COAL CUTTERS

AT BELL & ZOLLER

THEY RELY ON JEFFREY

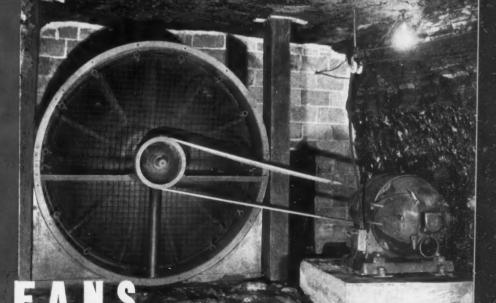
LOCOMOTIVES

AT BELL & ZOLLER

THEY RELY ON JEFFREY

MINE FANS

AT RELL & ZOLLER



SAVES MONEY ON CABLE REPAIRS

OPERATORS REPORT BIG SAVINGS

"When cables are frayed we make a saving of 89 cents to \$1.00 per cable splice with RU-BER-OID Tape."

"We save 50% of our splicing costs and defeat power losses and production delays by the constant use of RU-BER-OID Tape."

"We save approximately \$44.50 during the life of each mining machine cable by standardizing on RU-BER-OID Insulating Tape."



EXCEEDS A.S.T.M.
SPECIFICATIONS

by 300% in adhesiveness

by 26% in tensile strength

by 290% in dielectric strength

Splices made with RU-BER-OID Insulating Tape stay put. The tape never tears, ravels or puckers; it is highly resistant to abrasion by sharp coal; it is impervious to alkali and acid water. Its gripping power is not affected by grime or oily hands.

Both sides of this unique tape are adhesive

—it has to stick, regardless of climate or
temperature.

All of these features mean

a long, tough life and sound economy. An important additional economy feature is the fact that a single layer of this tape provides thorough insulation—due to its thickness, its high quality materials and its unusually high dielectric strength.

Order a supply of RU-BER-OID Insulating Tape today. Your supply house has it. You will start saving money from the first job. The Ruberoid Co., Executive Offices: 500 Fifth Avenue, New York, N. Y.



Asphalt Shingles, Insulating Paints, Built-up Roofs, Asbestos Insulations, Asbestos Pipe Coverings, Roof Coatings and Patching Plastic



SAND FLOTATION PROCESS

FOR CLEANING BITUMINOUS COAL

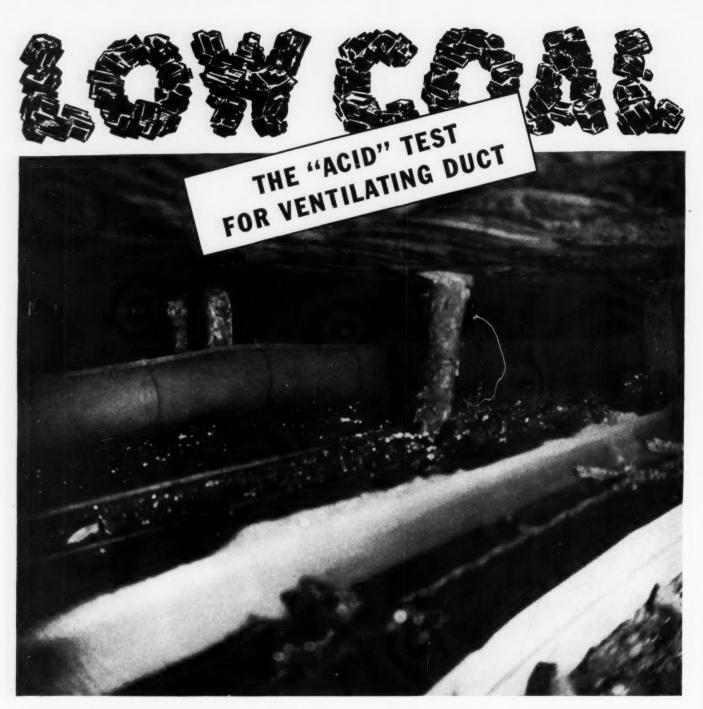
We design and construct complete coal cleaning plants and tipples.

United engineers & constructors inc

LOS ANGELES MEXICO, D. F. BUENOS AIRES PHILADELPHIA NEW YORK CHICAGO RIO de JANEIRO

MAXIMUM RETURN TO CLIENTS PER DOLLAR EXPENDED

December, 1937 - COAL AGE



ACID WATER, rot and fungus can't harm "Ventube" ventilating duct. It's made of extra-heavy, long-fibered Hessian cloth, heavily coated and impregnated with resistant rubber. "Ventube" is built to stand toughest mining conditions—and that means low coal!

The terrific concussion which follows the blast in low coal has no effect on "Ventube." There are no weak spots because the tear resistance is as great in the warp direction as in the filler. "Ventube" is the toughest flexible ventilating duct on the market!

"Ventube" provides adequate ventilation—the surest, safest solution to the coal dust problem. It carries needed fresh air to remote faces and forces out the highly explosive coal dusts.

"Ventube" is exceptionally easy to handle.

Install a few sections in your mine. Test "Ventube" under actual mining conditions. You'll find that it will speed up work and save money for you, too! Distributors spotted for quick service in all coal fields.



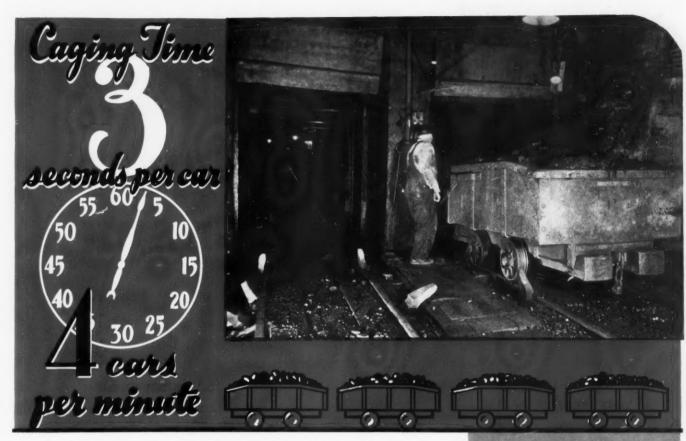
THE FLEXIBLE VENTILATING DUCT

E. I. DU PONT DE NEMOURS & CO., INC.

FAIRFIELD

"FABRIKOID" DIVISION

CONNECTICUT



BELL & ZOLLER hold Illinois hoisting record with NOLAN CAR CAGERS..

E CONOMY and dependability in caging, feeding and dumping effected by Nolan devices are typified by the fact that Bell and Zoller's Zeigler No. 2 mine made and holds the Illinois state hoisting record . . . a record in which our equipment played an important part. Bell and Zoller's Centralia mine is also Nolan equipped.

The most successful mines in the country effect lower car handling costs, eliminate guess work from loading and promote safety with devices conceived, designed and built under Nolan patents. Put your car handling problems up to our specialists... with more than a quarter of a century experience behind them. Their

specialized knowledge is at your service.

Write for booklet!



NOLAN DEVICES

Power Driven Rotary Dumps Gravity Cradle Dumps Platform and Self-Dumping Cages High Speed Automatic Cagers Automatic Car Lock and Release for Cages and Dumps Automatic Cushloned Horn and **Bumper Stop Dump Feeders Cushioned Car Stops** Trip Feeders and Trip Retarders Car Hauls Mine Car Retarders Trip Speed Regulators Incline Safety Stops Safety Shaft Gates Automatic Switches

THE MINING SAFETY DEVICE CO., BOWERSTON, OHIO



All Cats ARE GRAY IN THE DARK

... but most motors look alike even in daylight. However, there are as great differences in the sturdiness of motors as there are in the color of cats. It is sturdiness that prolongs the life of a motor and reduces maintenance costs and Allis-Chalmers Motors are the sturdiest motors on the market—bar none.

Do you want to prove this to yourself?

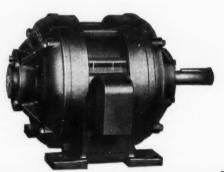
Then don't just compare dimensions and electrical characteristics, for they are identical in most motors; prices are also about the same. It is the workmanship, the materials and the construction of motors that you should examine carefully, critically, before purchasing.

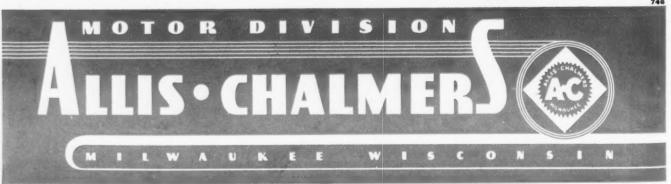
Careful examination of Allis-Chalmers Motors will reveal: ample insulation, with a big margin added for mechanical durability . . . studied use of steel throughout . . . cast steel

frames...rugged cast iron housings...heavy bearing enclosures—that is why they are so sturdy. That is why they are the best motor buy on the market.

For further information write for Bulletin No. 2173.

The Allis-Chalmers Mfg. Co. builds standard motors of every type from 1 hp. up—also motors for special application





"Sealed Protection"

Increases the consumer acceptance for millions of tons of fuel annually!

Protects fuel . . . protects consumer . . . protects sales—that is what COALKOTE's "sealed protection" does every year for producers and dealers handling millions of tons of fuel.

"Sealed protection" is the coating that results when COALKOTE is sprayed on the coal, coke or briquettes. The fuel is enveloped in a long-lasting, protective film of COALKOTE that effectively seals the dust within the fuel.

COALKOTE's "sealed protection" is the modern dust-

proofing treatment that answers the ever increasing demand for dustless stoker fuels. It controls the undesirable dust, protects the customer and increases the consumer acceptance.

Take advantage of this modern method to protect your sales of coal, coke and briquettes—write for complete information on "Sealed Protection".

SUN OIL COMPANY

Advtg. Dept. CK-6 PHILADELPHIA, PA.

NON-CORROSIVE



LONG-LASTING

EFFICIENT

INEXPENSIVE



A DUSTLESS TREATMENT for COAL, COKE and BRIQUETTES



"GOALKOTE"

WIRE ROPE and STRAND

... round out Bethlehem's line of Steels for Mining

The recent acquisition of the Williamsport Wire Rope Company places Bethlehem in a position to supply your requirements for wire rope and strand as well as the other steel products used in mining.

In Bethlehem Wire Rope you will find all of the thoroughgoing dependability that has been associated with the name Williamsport for nearly fifty years. And it is only natural to expect that these quality standards will be enhanced by the metallurgical and manufacturing experience of an organization making virtually all kinds and forms of steel for all industries.

The inclusion of wire rope in the list of Bethlehem steel products makes it possible for mine operators to obtain practically every form of steel they need from this one source. Bethlehem Steel Company has long been in close contact with the steel requirements of the mining industry through the supplying of ties, rails, cars, drill steel and other items. Now, with the engineering and contact personnel of Williamsport Wire Rope Company part of the Bethlehem organization, this company is in a position to render an even broader service in connection with the supply of the materials that take the brunt of mining.

With Bethlehem warehouses from coast to coast stocking wire rope and strand, your needs can be supplied quickly.





Steel Ties speed up track laying

No time is lost when track is laid on Bethlehem Steel Mine Ties. Simply set rails in place; knock the revolving clips over the flanges. Quick, positive, and safe. Fixed clips accurately set the gage; movable clips lock the rail in position. Where track must frequently be relaid, these ties can be used 30 and more times without any loss of grip.



Track bolts that make better rail joints

Joints can be pulled up tight with Bethlehem Track Bolts and Nuts. No chance of stripping threads in trying to get a firm connection. Bethlehem Track Nuts are hot forged, with the toughest, strongest steel right where the threads are cut. Nor will there be any trouble in spinning the nut onto the bolt by hand. Thread fit is excellent.



Bethlehem forged-steel wheels save on upkeep

Forged-steel wheels give the maximum amount of service for mine cars. They wear longer, they do not chip, and they will not crack. They are designed to be used with any standard tapered roller bearing and on either two- or four-axle cars. They are furnished ready for installation.



Other Bethlehem products for mines

Steel mine cars, abrasive-resisting plates, mine track equipment, steel sheets, track spikes, steel construction, tool steels, rock-drilling steels, mine-car axles.



ETHLEHEM STEEL COMPANY



CENTRALIA PLANT . . .

built in 1929 . . . still going strong

BETTER PREPARATION OF COAL NOT NEW WITH B & Z

As far back as 1929 Bell & Zoller sought and found "better preparation". The Centralia plant was built by Morrow as an answer to consumer demands of the day.

Still going strong the Centralia plant, after eight years, is giving highly satisfactory performance.

Many of the most outstanding preparation plants built in the coal industry during the past ten years were designed by Morrow and *built* to give years of low operating and maintenance cost service.

Whether it's a new plant or if a remodeling job will answer the requirements be sure to get a proposal from Morrow.

MORROW MANUFACTURING COMPANY WELLSTON OHIO



ROEBLING



BLUE CENTER

"WE USED TO PLAY



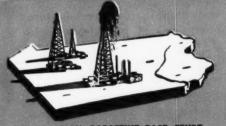


TIDE WATER

THERE IS A COMPLETE LINE OF TYCOL LUBRICANTS



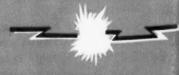
The Flying Yankee, Crack Train of the Boston and Maine and Main Central Railroad, is one of many Diesel powered units lubricated with Tide Water Diesel Lubricants.



100% PARAFFINE BASE CRUDE



assures



HIGHEST FLASH POINT

NURSEMAID ...

TO OUR BEARINGS

"UR jackshaft bearings formerly required so much attention that our oilers were regular nursemaids," is the way one engineer expressed a costly and bad mechanical condition in his mill. "When we changed to Tide Water products we got to the bottom of the trouble. By using the correct Tycol lubricant under conditions recommended by Tide Water engineers, oil consumption and costly waste were reduced 85%."

Tycol industrial lubricants produce many similar examples of effective savings, based on the quality of the Tycol line and the engineering service rendered by Tide Water. Tide Water's Edeleanu-refined Turbine and Diesel Oils, and Steam Engine, Bearing and Compressor Oils provide lubricants from which all harmful tarry and asphaltic residues have been removed. Of highest stability and free of the sludge-forming materials that ordinary refining does not eliminate, these lubricants offer maximum operating economy; this becomes an assurance when backed by Tide Water's engineering experience which guarantees the selection of the correct lubricant for every service.

Discuss your lubrication problems with Tide Water engineers. Ask a representative to call.

TIDE WATER ASSOCIATED OIL COMPANY
TIDE WATER DIVISION
17 Battery Place, New York, N. Y.

INDUSTRIAL LUBRICANTS

SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE



PULL MORE CARS

CONSUME LESS POWER

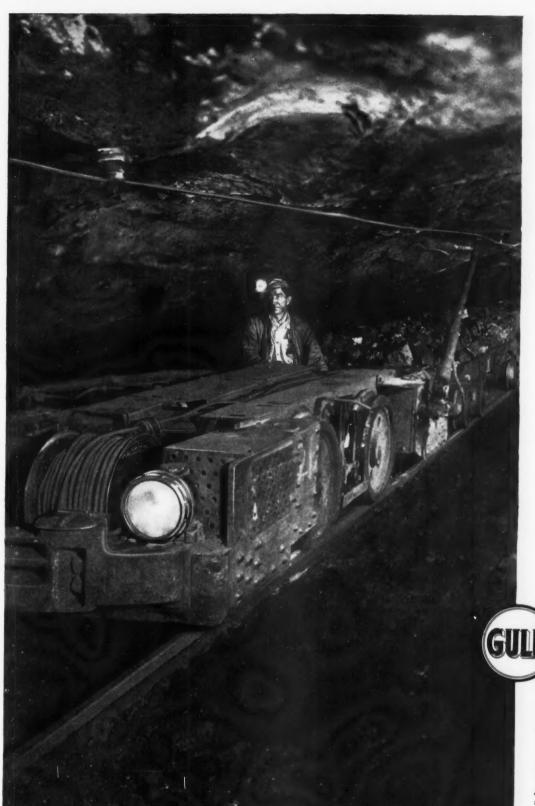
MINE LOCOMOTIVES have a lot of work to do
— including the job of overcoming friction in
car wheel bearings. When there is less friction,
locomotives can pull more cars out of the mine.

Gulf mine car greases do reduce friction. One leading mine manager reports that their 10-ton locomotives regularly pull ninety 3-ton cars, fully loaded, out of the mine at one haul — with Gulf mine car grease in anti-friction bearings of coal cars. Mine operators everywhere report increased efficiency in coal transportation from rooms to tipple after Gulf lubricants have been placed in service.

The results of efficient mine car lubrication

are bound to show up in the power bill. Less power is consumed to overcome internal friction. And — better still — Gulf mine car greases go further. They stay in the bearing, defying oxidation and maintaining their original character over longer periods of time.

The Gulf engineer who calls at your mine is trained to give you the kind of lubrication service that will save you money. And we have yet to find a mine where a careful study of equipment and operating conditions fails to reveal points where lubrication can be improved. Gulf Oil Corporation — Gulf Refining Company, General Offices, Gulf Building, Pittsburgh, Pa.





Wasted power, expended to overcome excessive friction in car wheels is an expense which can be minimized by the use of the proper Gulf lubricants as recommended by an experienced Gulf engineer. Efficient lubrication of cars enables locomotives to move more cars with less tractive effort.

GULF MINE CAR GREASES

Reduce Mining Costs

When a V-Belt Bends

"Changes SHAPE

That's the REASON for the

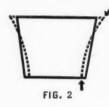
Concave Side

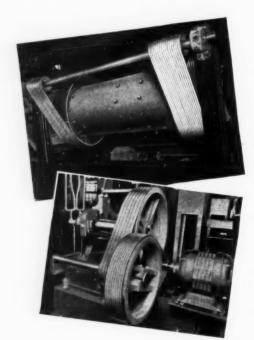
Any V-belt changes shape when it bends. The top is under tension and narrows. The bottom, under compression, widens. Figure 1 (below) shows the resulting shape-change in a straight-sided belt. Note the out-bulge of the sides.



WHAT HAPPENS WHEN A V-BELT

BENDS





Now look at figure 2. The same change of shape merely **straightens** the concave side, producing a contour that **precisely** fits the sheave groove.

Two big economies result: (1) No out-bulge at the side means uniform wear—longer life! (2) Full side-wall grip on the pulley holds heavier loads without slippage—a big increase in drive efficiency—saving belt wear and also saving power!

The Gates Vulco Rope is the only V-Belt built with the patented concave side.

Engineering Offices and Stocks in All Large Industrial Centers

THE GATES RUBBER COMPANY

Factory Branches

Terminal Building Hoboken, N. J. 2213 Griffin Street, Dallas 1524 So. Western Ave. Chicago 741 Warehouse St.
Los Angeles
999 South Broadway, Denver

GATES VULCE DRIVES



EMIL DEISTER

B. J. ROBERTS SALES MANAGER

NEW YORK SALES OFFICE 30 CHURCH STREET NEW YORK CITY

DEISTER MACHINE COMPANY DEISTER

DEINTER COMPOUND FUNNEL CLASSIFIERS
DEINTER COMPOUND FUNNEL CLASSIFIERS
PLAT-O ORE CONCENTRATING TABLES
PLAT-O COAL WASZING TABLES
PLAT-O VIBRATING SCREENS
MULTIRAP VIBRATORS

PRIEF SHEEL RUME ALMENA FORT WAYNE IND. U. S. A.

TELEPHONE A-3332 CABLE ADDRESS CEISTER ADDRESS LETTERS TO COMPANY ONLY

EMIL DEISTER JR

November 2, 1937

Tho are Particularly Interested in Coal Washing.

I want to acquaint you with our New Plat-O Coal Mashing Table rewant to acquaint you with our New Fiat-U Coal Masning Table recently put on the market. As I told a number of my friends, this tends actually handles about double the correctly formerly bendless and the correctly formerly bendless and the correctly bendless and th cently put on the market. As I told a number of my irlends, this table actually handles about double the capacity formerly handled Without any increase in the size of the deck or power required. Without any increase in the size of the deck or power required.

We recently demonstrated this conclusively in the Alabama field and as a result received an order for three more tables. and as a result received an order for three more tables. Shortly thereafter, we ran a capacity test for another operator which at thereafter, we ran a capacity test for another operator which are gain proved our statement and as a result received several more orders.

I know that you are interested in a coal washing table that will handle from two to three times the tonnage normally handled on nandle from two to three times the tonnage normally nanuted on coal tables and do this without any increase in floor space recoal tables and do this without any increase in iloor space required. And I also know that if you put in a trial table you will be construed that our statements are not exaggerated. orders. quired. And I also know that II you put in a trial to be convinced that our statements are not exaggerated.

Drop me a line today, in care of the <u>Deister Machine</u> Company, regarding a trial table installation.

DEISTER MACHINE COMPANY Eister

President

All equipment embodying the latest Deister improvements made since January, 1913, and another than the data is manufactured All equipment embudying the latest Deister improvements made since January, 1913, and covered by Deister patents and patents pending since that date, is manufactured and covered by Deister Patents and sold exclusively by Deister Machine Company.



COMPA

1933 E. WAYNE STREET

(INCORPORATED 1912) Cable Address "Deister" FORT WAYNE, INDIANA

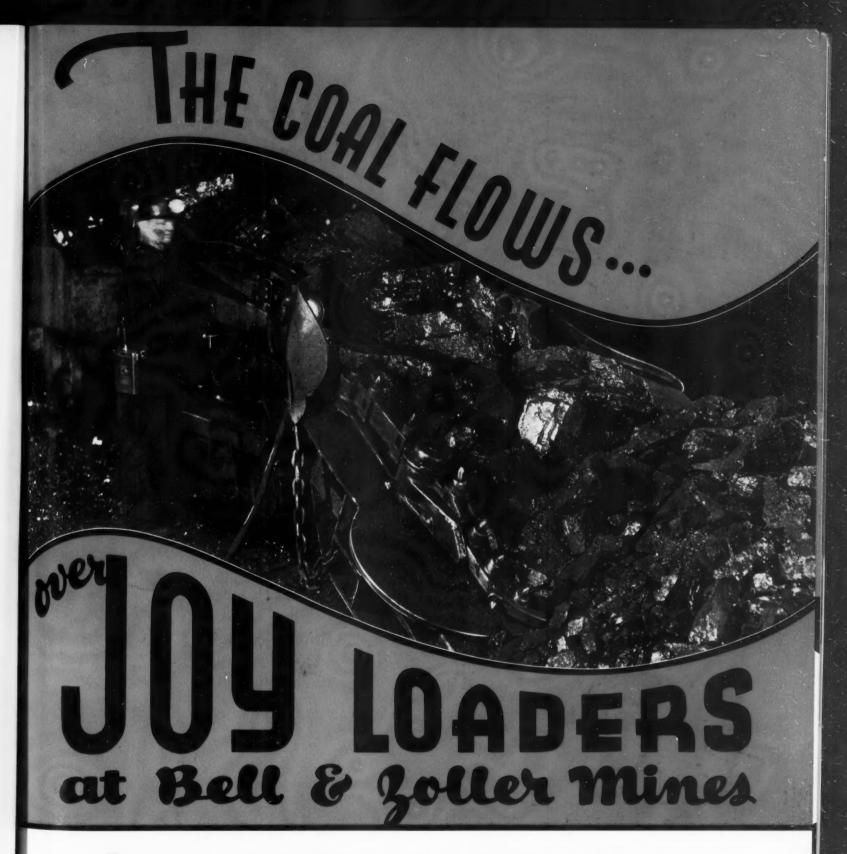
EMIL DEISTER, SR., Pres.

I. F. DEISTER, V-Pres.

EMIL DEISTER JR., Secy-Treas.

Manufacturers also of PLAT-O Coal Washing Tables, PLAT-O Ore Concentrating Tables, Heavy Duty PLAT-O Yibrating Screens, Deister Compound Funnel Classifiers.





AT the highly mechanized properties of Bell & Zoller, the coal flows constantly over Joy Loaders to efficient transportation systems that keep operating costs at a minimum and the production of high quality coal at a maximum, month after month and year after year.

To maintain this consistently high production it is necessary that each unit that goes into the Joy Loader functions properly.

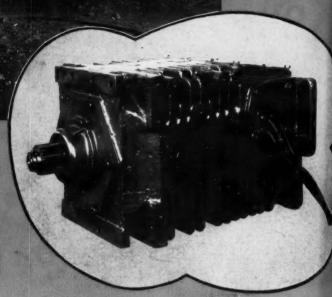
The manufacturers of the various units mentioned on the following pages share equally in the success of Joy Loaders at Bell & Zoller.

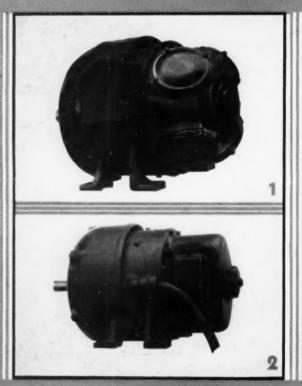
Joy Loaders show big savings





Reliance MOTORS





THE POWER BEHIND JOY PERFORMANCE AT BELL & ZOLLER

RELIANCE Motors are standard equipment on all Joy Loaders. Production records and low-cost maintenance at Bell & Zoller are evidence of the economy of Reliance power for this kind of work.

More than forty Joy Loaders are operating daily at Bell & Zoller under widely divergent

conditions. Reliance Motors keep these machines functioning consistently—efficiently—economically.

1 Fan-cooled, watertight D-C. motor designed for use underground.

Fan-cooled, explosiontested D-C. motor for permissible equipment.

RELIANCE ELECTRIC & ENGINEERING CO

BRANCHES:
Birminghem, Boston, Bullalo, Chicago,
Cincinneti, Detrolt, Greenville, S. C.,
New York, Philodelphia, Pitaburgh.

Joy Loaders show big savings



OHIO
FORGE & MACHINE
GEAR
UNITS
deliver Power to
JOY LOADERS
at
BELL & ZOLLER
properties

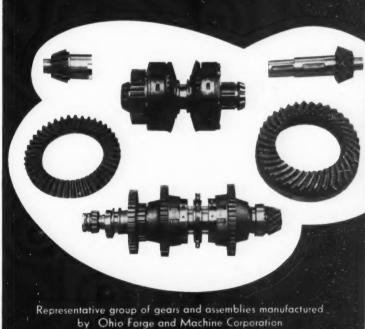
OHIO FORGE & MACHINE GEAR UNITS Deliver Power to JOY LOADERS At BELL & ZOLLER PROPERTIES

TO obtain and maintain the high daily tonnages at Bell & Zoller mines, Joy Loaders are subjected to the severest kind of operating conditions.

The gearing used in the various drive units has to be of the highest quality and of ample strength to stand the strain of continuous service.

OHIO Forge and Machine units are meeting these conditions with continuous, dependable service. They are doing their share in keeping tonnages up and costs down.

Consult Ohio Forge & Machine Corp. on your drive problems.



for use in Joy Loaders.

OHIO FORGE & MACHINE CORP.

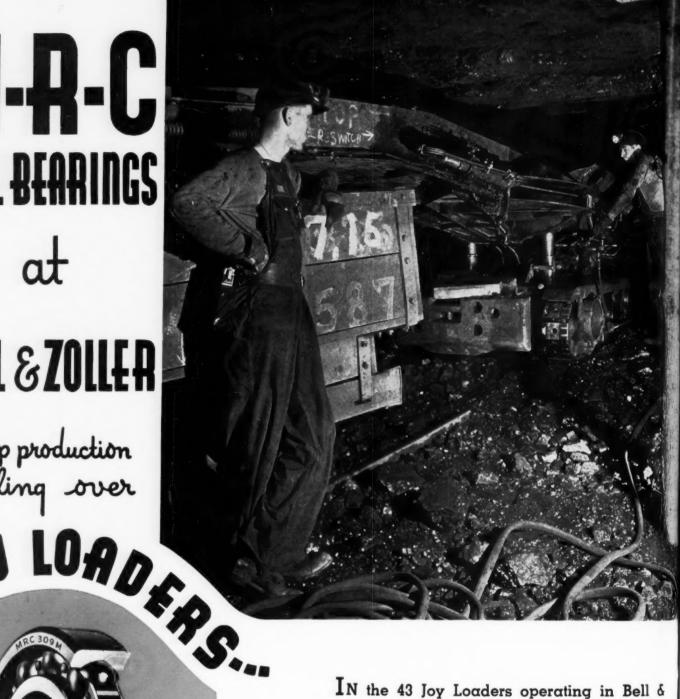
at Bell & Zoller Model Mines

M-A-C BALL BEARINGS

at

BELL & ZOLLEA

keep production rolling over



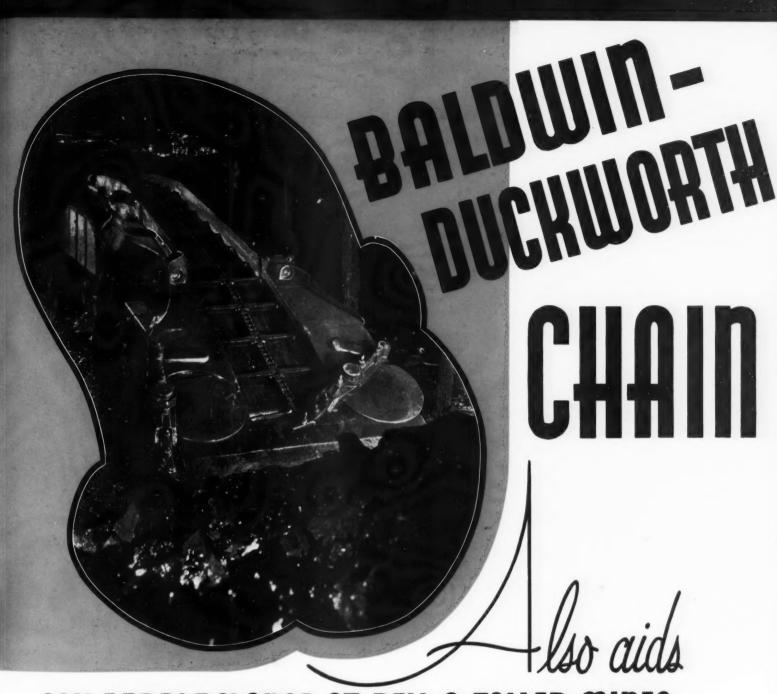




 ${f I}_{f N}$ the 43 Joy Loaders operating in Bell & Zoller properties, M-R-C Ball Bearings are used for supporting the radial and thrust loads in many of the gear units throughout the machines. This important function of M-R-C Ball Bearings is aiding Joy Loaders in maintaining high tonnages and low costs. An M-R-C Engineer will be glad to discuss your bearing problems with you.

MARLIN-ROCKWELL CORP

Joy Loaders show big savings



JOY PERFORMANCE AT BELL & ZOLLER MINES

THE patented articulated conveyor chain used on all 7 BU—8 BU and 11 BU Loaders in Bell & Zoller mines is the product of Baldwin-Duckworth.

This is tough service and calls for chain especially designed and built for this heavy duty.

Uninterrupted production hours for the loaders is the keynote of Joy's success at Bell & Zoller mines. Baldwin-Duckworth chains keep them in continuous service.

It will pay you to consult a Baldwin-Duckworth Representative for your chain requirements.

BALDWIN-DUCKWOATH CHAIN CORPORATION SPRINGFIELD - MASSACHUSETTS

at Bell & Zoller Model Mines



BELL & Zoller have been consistent users of Joy Loaders for the past 12 years and batteries of the original 5 BU Loaders at Zeigler No. 1 and No 2 Mines and at Centralia Mine are still doing a creditable job of loading coal—both as to tonnages and low production costs. In addition to the 5 BU Loaders, there

are seven 11 BU Loaders and one 7 BU Loader at Zeigler No. 1 Mine and ten 11 BU Loaders at Zeigler No. 2. There is also an 8 BU Loader at Crescent No. 6 Mine.

7-1

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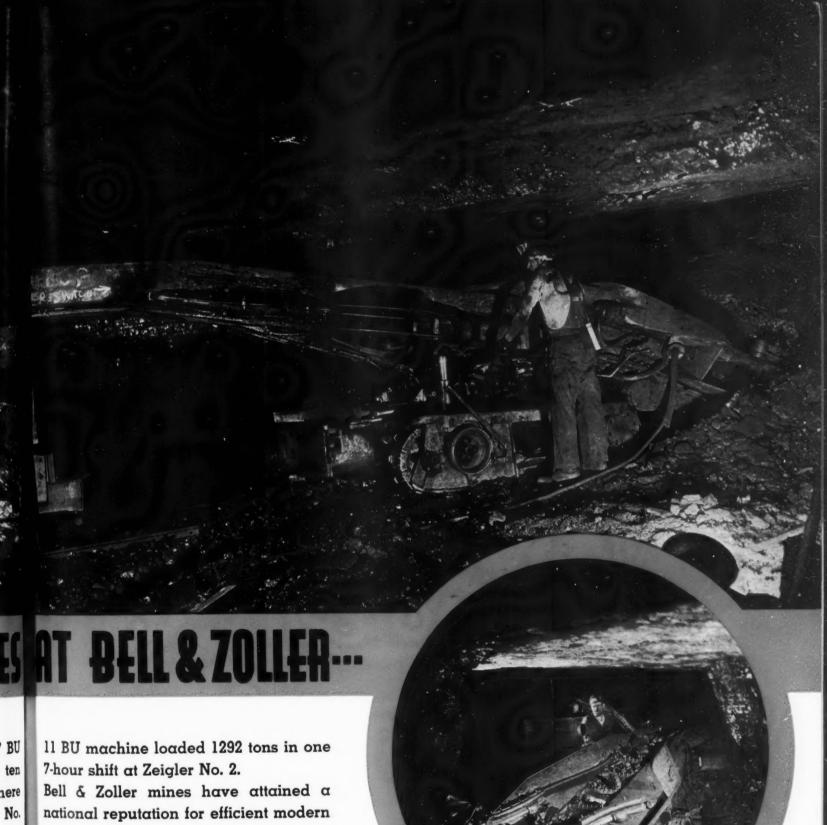
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ing

These machines have made enviable records in maintaining high tonnages with resultant low cost production. One

JOY MANUFACTURING

Joy Loaders show big savings



Bell & Zoller mines have attained a national reputation for efficient modern mining methods and economical operation and Joy Loaders have played an important part in the successful working of Bell & Zoller properties.

able

iges One

JOY 5 BU LOADER Coming Up

company-franklin, pa-

at Bell & Zoller Model Mines

THE PRODUCTION PRODUCTION

SIMPLEX-TIREX CABLE

THE POWER LINE . . . TO GREATER PRODUCTION

Three hundred feet of Simplex-Tirex Cable is standard original equipment on all Joy Loaders. The huge tonnages produced and the continuity of service of Joy Loaders at Bell & Zoller speaks volumes for the unfailing power service delivered by Tirex Cable on these machines.

Call on a Simplex Representative to discuss your power problems.

SIMPLEX WIRE & CABLE COMPANY
79 SIDNEY ST., CAMBRIDGE, MASS.

Joy Loaders show big savings

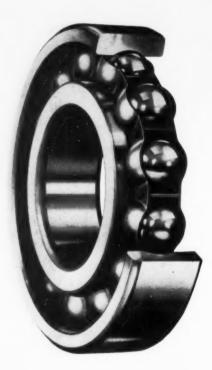


Westinghouse



at Bell & Zoller Model Mines





DEPARTURE

AT strategic points throughout the Joy Loaders at Bell & Zoller, you will find many New Departure Ball Bearings.

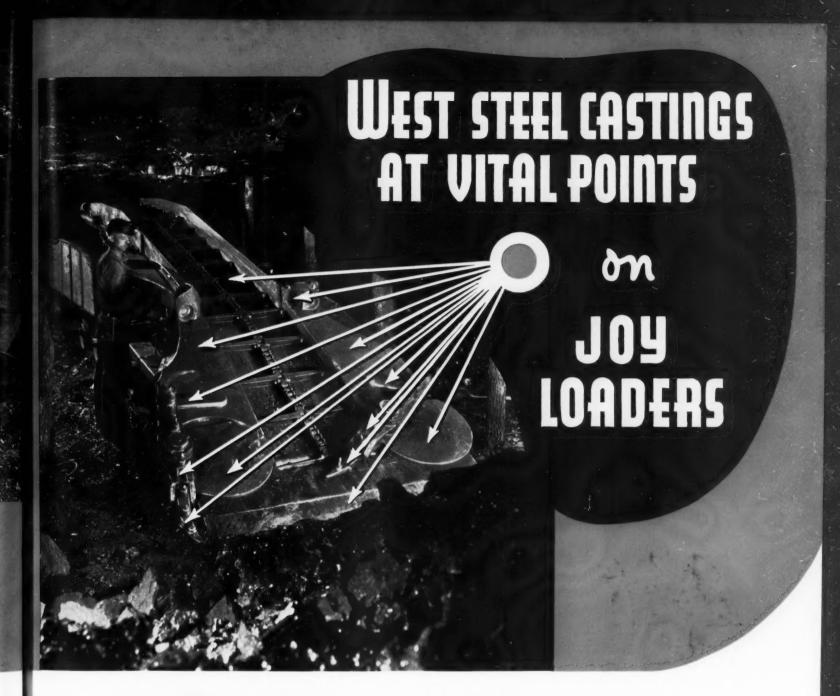
The enviable tonnage records and the low cost production of Joy Loaders at Bell & Zoller properties indicate the kind of performance that can be expected from New Departure Ball Bearings.

There's a New Departure Bearing for practically every bearing service. Consult a New Departure Representative on your problems.

NEW DEPARTURE
Division General Motors Corporation
BRISTOL, CONNECTICUT

BALL BEARINGS

Joy Loaders show big savings



WEST Steel Castings are used extensively throughout Joy Loaders to insure the strength necessary to stand up under the gruelling service demanded in modern coal mining.

Joy Loaders at Bell & Zoller Mines are maintaining heavy production schedules and West Steel Quality Castings at strategic points are keeping Joy Loaders on the job.

Joy uses West Steel Quality Castings, both Carbon and Alloy, for strength and durability and Joy records at Bell & Zoller confirm the shrewdness of their selection.

When Better Steel Castings are made West Steel Castings will make them

THE WEST STEEL CASTINGS COMPANY

at Bell & Zoller Model Mines

Veterans at Centralia
THE FIRST JOY 5-BU LOADER
ENTERED THIS MINE IN 1927

oday, 7 Joy 5-Bl Loaders are keeping production up and costs down

Consult a JOY Engineer on your mining problems

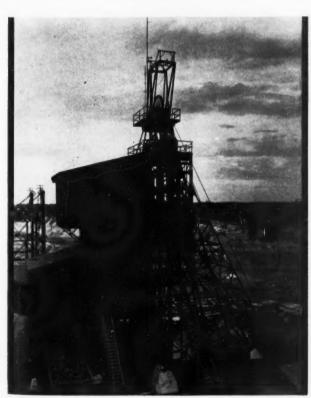
JOY MANUFACTURING COMPANY

at Bell & Joller Model Mines

"Hercules" (Red-Strand) Wire Rope Selected by Bell and Zoller for Heavy Hoisting at Their No. 1 and No. 2 Mines



Headframe of Bell & Zoller No. 1 mine is shown above, while their No. 2 mine is shown below. Both of these shafts are equipped with "HERCULES" (Red-Strand) Wire Rope. The combined daily capacity of these two mines is 12,600 tons.



And "HERCULES" (Red-Strand) Wire Rope is the choice of many other coal producers, because they, too, have found that it can be depended on for both safe and economical service.

The unusual lasting quality of this wire rope is not a matter of chance, but the definite result of acid open-hearth steel wire, our system of rigid tests and inspection, plus our 80 years of manufacturing experience.

The real test of a wire rope is on the job. There is where "quality" counts; there is where claims give way to facts; and there is where "HERCULES" (Red-Strand) Wire Rope has proved, and continues to prove its exceptional value.

Made in Round Strand and Flattened Strand constructions, both of which can be furnished either Regular or Preformed.



Made Only By

A. Leschen & Sons Rope Co.

Established 1857

5909 Kennerly Avenue ST. LOUIS, MO.

New York	90 W	est Street
Chicago		gton Blvd.
	1554 Wa	
San Francisco	520 Fou	irth Street
Portland		h Avenue

KEEP COSTS DOWN AND REALIZATION UP



The "WHALEY AUTOMAT" Coal Loader

Generations of experience proved that the SHOVEL PRIN-CIPLE provided the easiest and most efficient method of loading coal by hand. The "WHALEY AUTOMAT" has proved that the SHOVEL PRINCIPLE is equally superior in mechanical loading and that the fastest and cheapest way Shovel it to load coal—in room, entry or pillar work is to

with the

"WHALEY AUTOMAT"

Realization from coal loaded by "WHALEY AUTOMATS" is high because its smooth, easy shovel movement loads the most fragile coal without breakage, rapid vertical adjustment of shoveling mechanism enables it to make a perfect cleanup without penetrating even a very soft bottom, no dirt from pavement is loaded with coal.

Power Demand: One 25 H.P. motor.

PARALLEL LIFT REAR CONVEYOR OF "WHALEY AUTOMAT" makes a perfect discharge to cars — in low position at start of loading, coal falls minimum distance to bottom of car; in high position at end of loading, car can be crowned as high as roof clearance will Power Consumed: permit (no other loader is equipped with parallel lift conveyor).

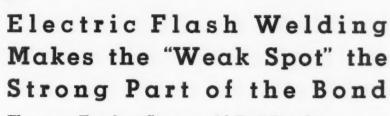
One-fifth KW Hr. per ton

Ask for the "WHALEY AUTOMAT" catalog and Motion Booklet—also tell us about your loading conditions. We'll submit interesting data regarding "WHALEY AUTOMAT" performance.

Coal Loaded: Three tons per min.

MYERS-WHALEY CO., INC. [SINCE 1908] KNOXVILLE, TENN.

SUPER-WELD



The new Everlast Super-weld Rail Bond is an outstanding improvement in power bonds for general mine use. Made by the Electric Flash Weld process, it offers longer life, higher tensile strength, and greater conductivity.

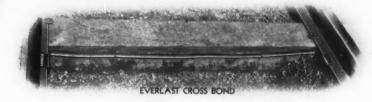
Users Enjoy These Benefits

- 1. No "weak spot" for vibration to break down.
- 2. Cannot be damaged by heat of welder's arc.
- 3. Longer life—indestructible in normal service after proper installation.
- 4. Higher tensile strength.
- 5. Greater conductivity—terminals are soft steel.
- 6. Easy to install—even by inexperienced welders.
- Protected by base of rail—cannot be injured or sheared off by derailed cars. No "hump" in terminal for wheel flange to break off.
- Can be used over again by cutting with cold chisel just back of weld.
- Reversible—can be used on top of rail base if desired.

PENN MACHINE COMPANY

Huntington, W. Va. JOHNSTOWN, PA. Pittsburgh, Pa.

REVERSIBLE — Equally adaptable for use over or under rail base





TERMINAL UNDER RAIL, CABLE OVER TIES



TERMINAL AND CABLE OVER RAIL BASE

Are you accepting



the challenge of COR-TEN?

FOR years engineers and designers have said "Give us a steel that is stronger—that will stand up in service—give it to us at a price we can afford to pay—and we will build our equipment lighter."

So we produced Cor-Ten

- almost twice as strong as ordinary steel
- with 4 to 6 times the resistance to atmospheric corrosion.
- with greater impact strength
- with superior fatigue resistance
- high in abrasion resistance
- a steel you can fabricate with little change in shop practice
- a steel that has made it possible to build mine equipment 20-50% lighter just as strong, just as rugged as the heavy construction it replaces.

And now, the one obstacle to Cor-Ten's general use has been removed. Today, its cost per pound is so close to that of ordinary steel that in many applications Cor-Ten actually costs less per unit of strength than plain steel.

Thus Cor-Ten meets all requirements set for the ideal material for lightweight construction—it has great strength, superior endurance and stamina, unusually high corrosion resistance. Its cost is reasonable. So why not build lighter with Cor-Ten? Why not get rid of excess weight that costs you money every time you move it?

Find out how little it costs to apply Cor-Ten in your equipment. Find out how much weight Cor-Ten construction will save, how much you can increase capacity of mine cars, hoists, mine skips, shovels and dragline equipment, without increasing operating costs. Send us your drawings—our engineers will be glad to assist you.



UNITED STATES STEEL

ADD "PREFORMING" FOR GREATER ECONOMY

Take Yellow Strand, that great wire rope which has been making enviable records in the coal fields for so many years—

Add to it *preforming*, and you have "Flex-Set" Preformed Yellow Strand, the superwire rope that is establishing new records in long life and economy wherever coal is mined.

Preforming the wires and strands produces properties not possessed by any wire rope of regular construction. It is limp and easy to handle. It operates smoothly on drums and sheaves, and is highly resistant to kinking, drum crushing and fatigue.

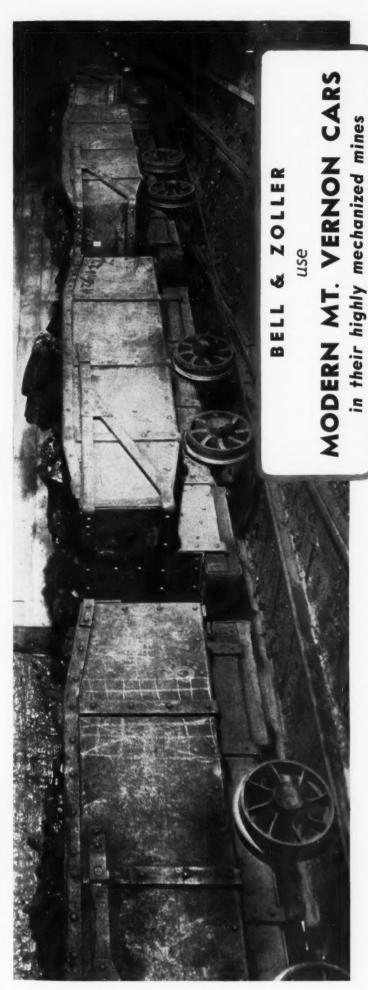
Use "Flex-Set" Preformed Yellow Strand

for genuine economy.

BRODERICK & BASCOM ROPE CO., St. Louis

Factories: St. Louis, Seattle, Peoria. Branches: New York, Chicago, Seattle, Portland, Houston.





Leaders in mechanized mining, the Bell & Zoller Coal and Mining Company uses hundreds of modern Mt. Vernon mine cars in their Zeigler, Centralia and Peoria properties.

The Mt. Vernon cars shown above, in Zeigler No. I mine at Zeigler, Ill., are equipped with copper-bearing steel plates, and up to date appurtenances to

assure long life and low haulage costs under the severest working conditions.

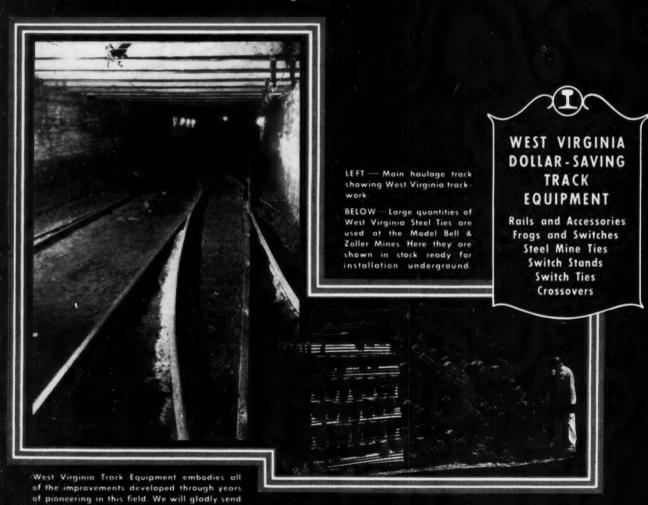
Write us regarding your mine car requirements or our engineers will call and study the conditions to be met. We make all types and sizes—to your specifications, or from our own designs and pat-

MT. VERNON CAR MFG. COMPANY, MT. VERNON, ILLINOIS

WEST VIRGINIA TRACK EQUIPMENT Contributes to Low Cost Haulage at Bell & Zoller

● Throughout the highly mechanized mining operations of Bell & Zoller Mines, improved trackwork is highly essential to fast and uninterrupted haulage. Thus, West Virginia Rail Company's track equipment...including rails and accessories, frogs, switches, steel ties and turnouts...are practically standard in maintaining good roads, and for new extensions.

For instance: West Virginia Rails, Ties and Turnouts make the 60 lb. main haulage tracks and the 35 lb. room tracks at the Ziegler Mines safe and efficient. At the other operations of this company West Virginia trackwork also is an important factor in maintaining economical and safe haulage.



THE WEST VIRGINIA RAIL COMPANY
HUNTINGTON WEST VIRGINIA

The **BELL & ZOLLER** Cleaning Plant Is GENERAL ELECTRIC **EQUIPPED Throughout**

Reproduced from a painting of the new cleaning plant of the Bell and Zoller Coal and Mining Company at Zeigler, III. A beautiful full-color reproduction can be obtained by writing General Electric Company, Room 323, Building 6, Schenectady, New York.

GENERAL & ELECTRIC



Why BELL & ZOLLER SPECIFIED GENERAL ELECTRIC EQUIPMENT FOR ITS 1000-TON-AN-HOUR CLEANING PLANT

ECHANIZED and electrified throughout, the new 1000-ton-an-hour cleaning plant of the Bell and Zoller Coal and Mining Company at Zeigler, Illinois, is recognized as an excellent example of how progressive coal mining companies are going after greater profits by washing their coal before shipping it

It is significant, therefore, that the entire electric installation in this plant is General Electric.

to market.

Years of experience with G-E equipment have given Bell and Zoller convincing evidence of its dependability in all phases of mining service. The 750-kw turbine-generator in the power plant, for example, has been in operation for more than 20 years without giving the slightest trouble. The many motor-generator sets, locomotives, and other General Electric equipment have given long, uninterrupted service, and only the most routine kind of maintenance has been required.

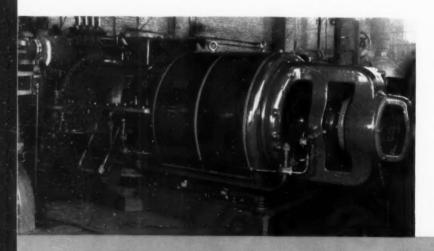


G-E 8-ton cable-reel locomotive used for gathering duty in the No. 1 Mine at Zeigler. G-E locomotives have given Bell and Zoller long, uninterrupted service

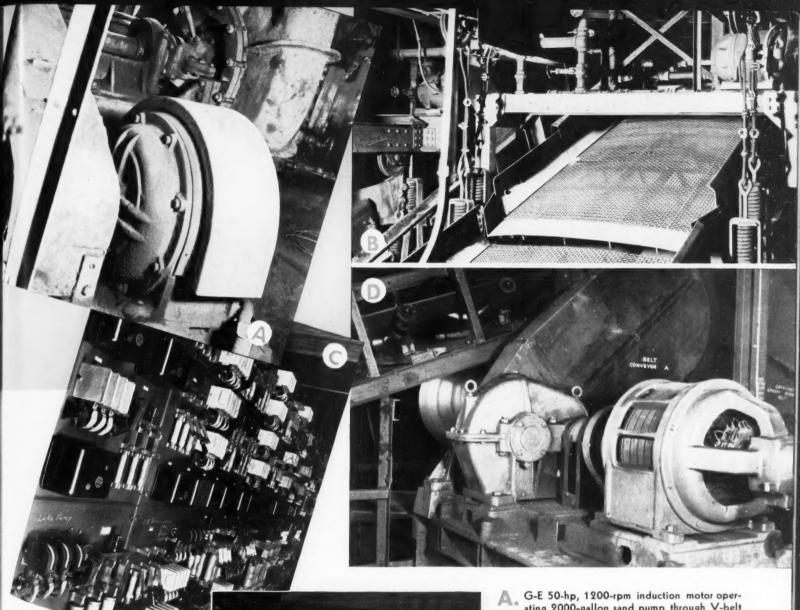
Furthermore, the Bell and Zoller Company has found General Electric field and application engineers ready to co-operate with it at all times on its electrical problems. It was at the suggestion of these engineers, for example, that Bell and Zoller materially increased its hand-operated and automatic arc-welding equipment and thereby laid the foundation for its present complete repair, maintenance, and fabrication facilities.

Outstanding dependability and service—these are the reasons why G-E equipment was selected for the Bell and Zoller cleaning plant. And you can obtain these same advantages for your mining operations—from mine face to railroad car; for General Electric is prepared to fill all the electrical requirements of the mining industry. General Electric, Schenectady, New York.

Here is the G-E 750-kw turbine-generator which generates a-c current for mining equipment and which has been giving trouble-free operation for more than 20 years



GENERAL



Here are Some Types of Equipment In the Cleaning Plant That Are Driven by the 73 G-E Motors

Conveyors
(of every description)
Loading boom hoists
Bucket elevators
Screens
Crushers
Shaking chutes
Sand cones

Water pumps
Sand pumps
Air-cleaning boxes
Fans
Feeders
Loaders

G-E 50-hp, 1200-rpm induction motor operating 2000-gallon sand pump through V-belt drive. Like most of the 73 motors in the washery, it is a standard, open type with splash cover added at plant.

G-E 10-hp, 1200-rpm, totally enclosed, fancooled motor driving dewatering and desanding screen. Total enclosure of the motor—as in this application—is advisable when it is operating under adverse conditions of dust or dirt

The motors in the washery are controlled from two G-E control panels, which provide sequence starting of operations. The "brains" of the washery operations, this control is an important factor in making possible efficient, safe, and continuous operations.

This G-E 150-hp, 900-rpm wound-rotor motor drives the main conveyor in the washery.

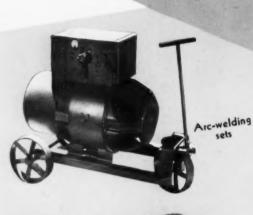
The conveyor is 250 feet long, and its rated capacity is 1000 tons an hour

This railroad-type rotary car dump empties cars coming to the washery from No. 1 Mine It is operated by double hoisting drums driven by a G-E 100-hp motor



ELECTRIC

Pointing the Costs Per Ton

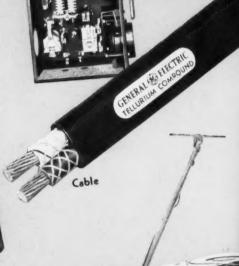






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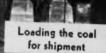


Control





A COMPLETE LINE OF ELECTRIC EQUIPMENT FOR MINING SERVICE

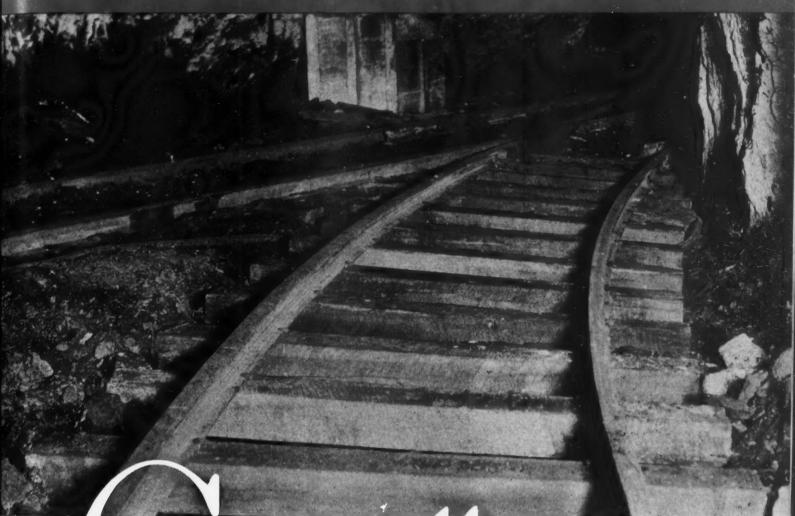


GENERAL (%)



ELECTRIC

Check decay with ...



Trasselli. Chromated Zinc Chloride

• Avoid costly replacements and delays to haulageway traffic by installing timber treated with GRASSELLI Chromated Zinc Chloride. It will outlast 5 to 6 untreated installations.

Decay is caused by a fungous growth which weakens timber structure impairing the load bearing strength and spike gripping power. Dampness which is usually present in coal mines accelerates decay to the extent that an average untreated timber lasts only $2\frac{1}{2}$ years.

Many mines are now using timber treated with GRASSELLI Chromated Zinc Chloride. Its resistance to decay and excellent fire retarding properties make it the choice preservative.

Write for your copy of "Wood Preservation for Mines."

E. I. DU PONT DE NEMOURS & COMPANY, INC.

GRASSELLI CHEMICALS DEPARTMENT GRASSELLI

Wilmington, Delaware



P.H Pacemakers-FASTER ON THE JOB

Here, in a nutshell, is the story of all-welded excavator construction with alloy steels. At the bottom is an old type carbody . . . it is cast . . . subject to cracking under strain . . . its actual strength is never known. . . . Above is the new type P&H carbody, made of tough rolled steels. Every inch of its uniform cross-sectional strength is accurately predetermined. The welds are

actually stronger than the parent metal itself. This new carbody eliminates a good 25% dead weight, reduces ground pressure, costs less to run, less to maintain. The excavator industry will gradually adopt this more practical design. For information on P&H excavators from 3/8 to 5 cu. yds. capacity, address the Harnischfeger Corp., 4540 W. National Ave., Milwaukee, Wis.

HARNISCHFEGER

EXCAVATORS * ELECTRIC CRANES * ARC WELDERS (

PEH

HOISTS * WELDING ELECTRODES * MOTORS



Used in the wet cleaning section of this modern preparation plant for reclaiming stoker size from crushed coal and refuse, this $3^{1}/_{2} \times 10$ foot Symons Double Deck Screen combines greater capacity with closer sizing than would otherwise be possible.

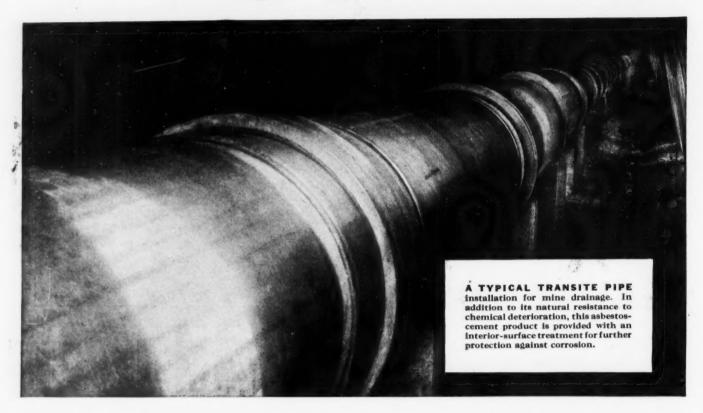
Because of the distinctive high speed imparted by a balanced eccentric drive, the Symons Screen operates in a level position and requires less headroom. It is better able to meet present day demands of high capacity, precise sizing and less degradation.

For wet and dry screening, rescreening, dedusting or dewatering, there is a size and type of Symons Screen for every coal screening job

NORDBERG MFG. CO., MILWAUKEE WISCONSIN

MINE DRAINAGE...

a tough experience for any pipe!



BUT in Transite Mine-Drainage Pipe, Johns-Manville offers a material basically resistant to the ravages of corrosion

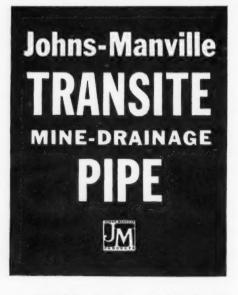
SOME years ago Transite Pipe went to work in the mines. Carrying drainage water high in sulphuric acid, this asbestos-cement product proved that a pipe's life span could be measured in years, rather than months.

And length of life isn't all. Transite Mine-Drainage Pipe is economical to install or relocate. Relatively light in weight, it is readily handled without mechanical equipment in all except the very largest sizes.

Its Simplex Couplings provide quick assembly by inexperienced crews. Rapid relocation, too. Remarkably flexible, these couplings permit long sweeps without special fittings. And joints remain bottletight in spite of sharp variations in grade.

In short, Transite Pipe . . . with a service record for economical water transportation that goes back a quarter-century and covers thousands of miles throughout the world . . . offers every advantage designed to assure longer life in mine-drainage service.

Why not get all the facts? Write for a copy of our Transite Pipe brochure. Address Johns-Manville, 22 East 40th Street, New York City.



Better track in 3 ways with

BETHLEHEM STEEL MINE TIES

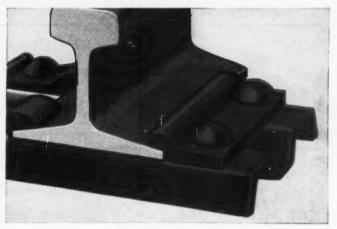
ACCURATE GAGE—No chance of derailments because of out-of-gage track when Bethlehem Steel Mine Ties are used. Gage is set by clips riveted to the ties. Rails are locked under these clips.



RAILS SECURELY HELD—Forged-steel clips lock the rail in position. It can't slip or turn over. The special design of the clips eliminates any possibility of working loose from vibration.



AMPLE SUPPORT—The channel section of these rolled-steel ties gives plenty of strength to carry any load which the rails themselves can safely carry, at the same time keeping weight low.



This better, safer track means faster train movement with practically no danger of derailment. And this is not the only advantage in using Bethlehem Steel Mine Ties. Because

there is no spike driving, no gaging, track can be laid faster. And because there is nothing to wear, nothing to become spike-cut, ties last indefinitely, even where track is frequently relaid.

BETHLEHEM STEEL COMPANY



Coal Mining IS A Hercules Job



Hercules Permissibles

for Lump Coal

HERCOAL F-1
HERCOAL D
HERCOAL C-1
RED H C, L.F.
RED H D, L.F.

Patented original high cartridge count permissibles, producing lump with economy and safety.

Particularly adapted for production of lump in seams where lower cartridge count and higher strength are necessary.

for Fine Coal

RED H B, L.F.

High rate of detonation makes these two permissibles suitable for rock work or for blasting fine coal. Use Red H B in tight places; in easier shooting, use Collier C, L.F.

for Wet Work

HERCOGEL

HERCOGEL 2

True gelatin permissible. Offers highest water resistance of any permissible.

Original semi-gelatin permissible; effects saving of 15% to 20% over older type gelatin permissibles. For rock work in gassy or dusty mines.

Hercoal, Red H, and Hercogel are registered U. S. Pat. Off. by Hercules Powder Company

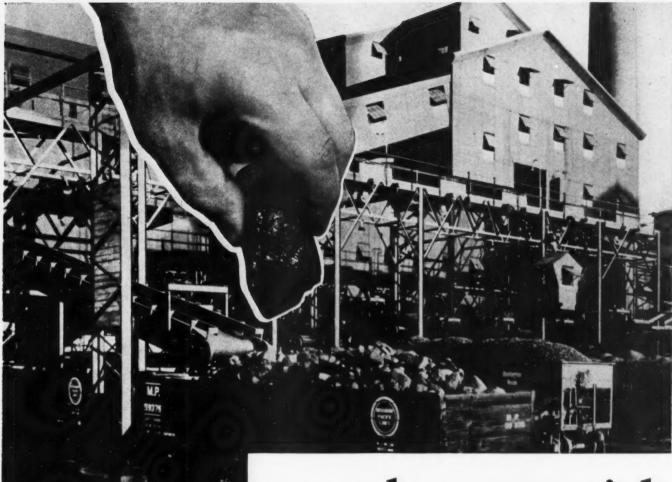


HERCULES POWDER COMPANY

INCORPORATED

936 KING STREET WILMINGTON, DELAWARE

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The Robins (Mead-Morrison) T.P.H. car dumper used at the Bell and Zoller Plant handles cars up to 70 Ton.

take your pick

All sizes and any combination of mixed sizes are constantly available at the Bell and Zoller Tipple.

Robins Designers in collaboration with Bell and Zoller Engineers, planned the unique system of conveyors, screens and crushers to make this possible.

Beside wide availability of sizes, every care was exercised that the coal produced should be accurate, sound and clean. Experience has proven that such coal has wider markets and commands a better price.

The following Robins Equipment is used in the Bell and Zoller Preparation Plant

- 1-1,000 T.P.H. Mead-Morrison Car Dumper
- 2-Reciprocating Feeders
- 1-Belt Feeder
- 4—Belt Conveyors
- 12—Scraper Conveyors
- Belt & Bucket Elevators
- -Flight Conveyor Loading
- 1-Belt Conveyor Loading Boom
- -Cataract Grizzlies
- 3—Crushers 11—GYREX Screens
- 1-VIBREX Screens
- -Car Retarders
- All Necessary Chutes Numerous other incidental items The Complete Cleaning Equipment Wet and Dry

Robins Engineers are at the service of operators of both large and small plants. Write for full particulars.

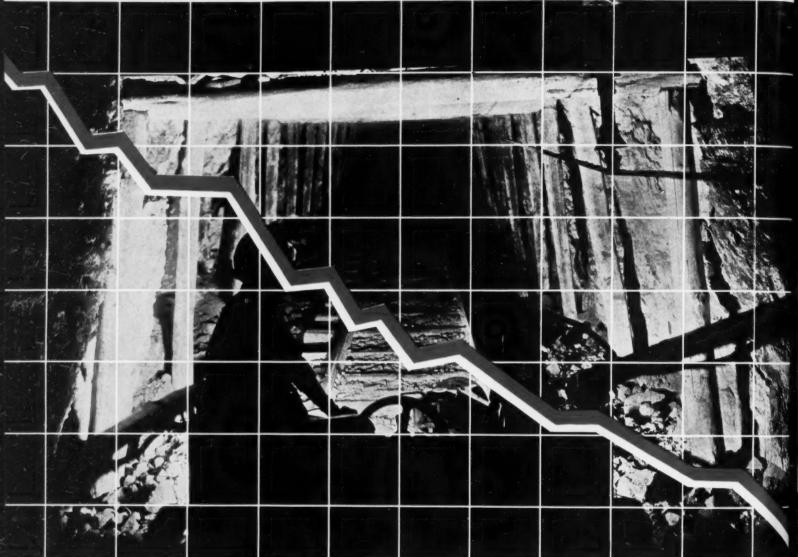
ROBINS

CONVEYING BELT CO. 15 PARK ROW, NEW YORK, N. Y.



OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

REduce your TIE



Your advantages through using Kettle River Zinc Chloride Treated Mine Products:

1. COST REDUCED

- Production expense
- Lower Supervision charges
 - Amount timber required

2. DELAYS DECREASED

- Timber repairs
- Fewer Replacements
 - Production interruptions

3. SAFETY INCREASED

- Eliminates Decay weakened timber and Roof and side falls

There are only two recognized preservatives!

Zinc Chloride • Coal Tar Creosote

Kettle River products are pressure treated either with zinc chloride salt solution or coal tar creosote. Zinc chloride and coal tar creosote, are acknowledged to be the two superior wood preservatives:-specifications of the American Wood Preservers' Association, American Railway Eng. Ass'n. and the Federal Government highly favor their use. Coal tar creosote is conceded to be the most effective, but K-R zinc chloride is advantageous for many conditions such as usually found in mines. Every impressive tie and timber service record is based on the use of one or both of these preservatives.

und TIMBER Cost

R zinc chloride treated timber sets in modern mine.



K-R zinc chloride treated mine ties.

with Kettle River Zinc Chloride Pressure Treated **Products**

HE use of Kettle River zinc chloride treated mine ties and timber offers a way to substantially reduce operating expenses. The millions of dollars which the railroad industry has saved each year, over a long period of years, through using treated ties, is an indication of what the mining industry may accomplish.

The average life of untreated material is 4 yearsthe life of Kettle River treated products is 20 years or more. Figure in dollars and cents what you could save if your ties and timber would last 5 times their present life.

Mail the coupon below and you will receive our new booklet "Looking Ahead at Timber Problems". It proves the economy of using Kettle River Co., treated products.

KETTLE RIVER COMPANY

Sales Office

1218 Olive St.

St. Louis, Mo.

Send today for further details

Kettle River Company

Sales Office

1218 Olive St., St. Louis, Mo.

Gentlemen: I am interested in the economy of K-R treated products. Please send me details without obligation.

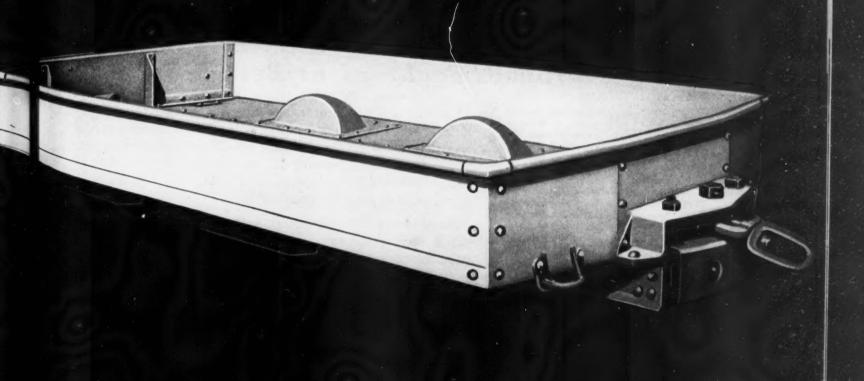
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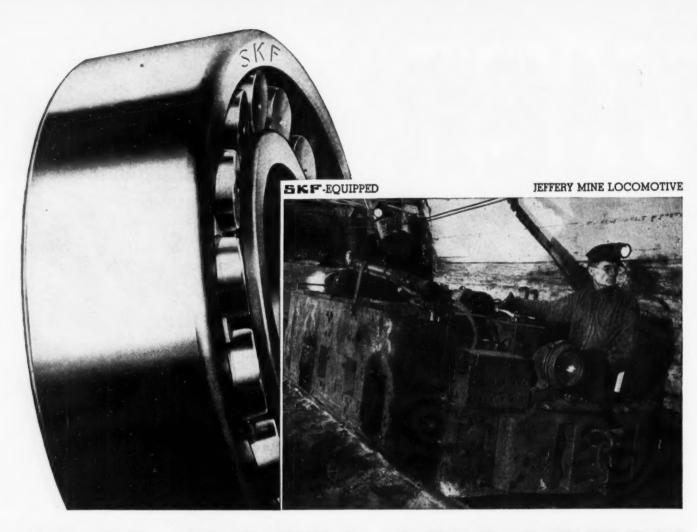
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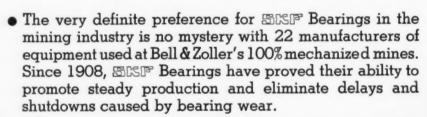




COAL MOVES SMOOTHLY

on SKF-equipped machines at Bell & Zoller's

The SKF roster of plus-performance users at Bell & Zoller's: The Jeffrey Mfg. Co... Westinghouse Elec. & Mfg. Co... General Electric Co... Goodman Mfg. Co... Myers-Whaley Co., Inc... Goulds Pumps, Inc... Deming Co... Robins Conveying Belt Co... W. S. Tyler Co... Nordberg Mfg. Co... Morris Machine Works... American Air Filter Co... Fairbanks, Morse & Co... Gardner-Denver Co... American Steam Pump Co... Broderick & Bascom Rope Co... Roberts & Schaefer Co... Robinson Mfg. Co.



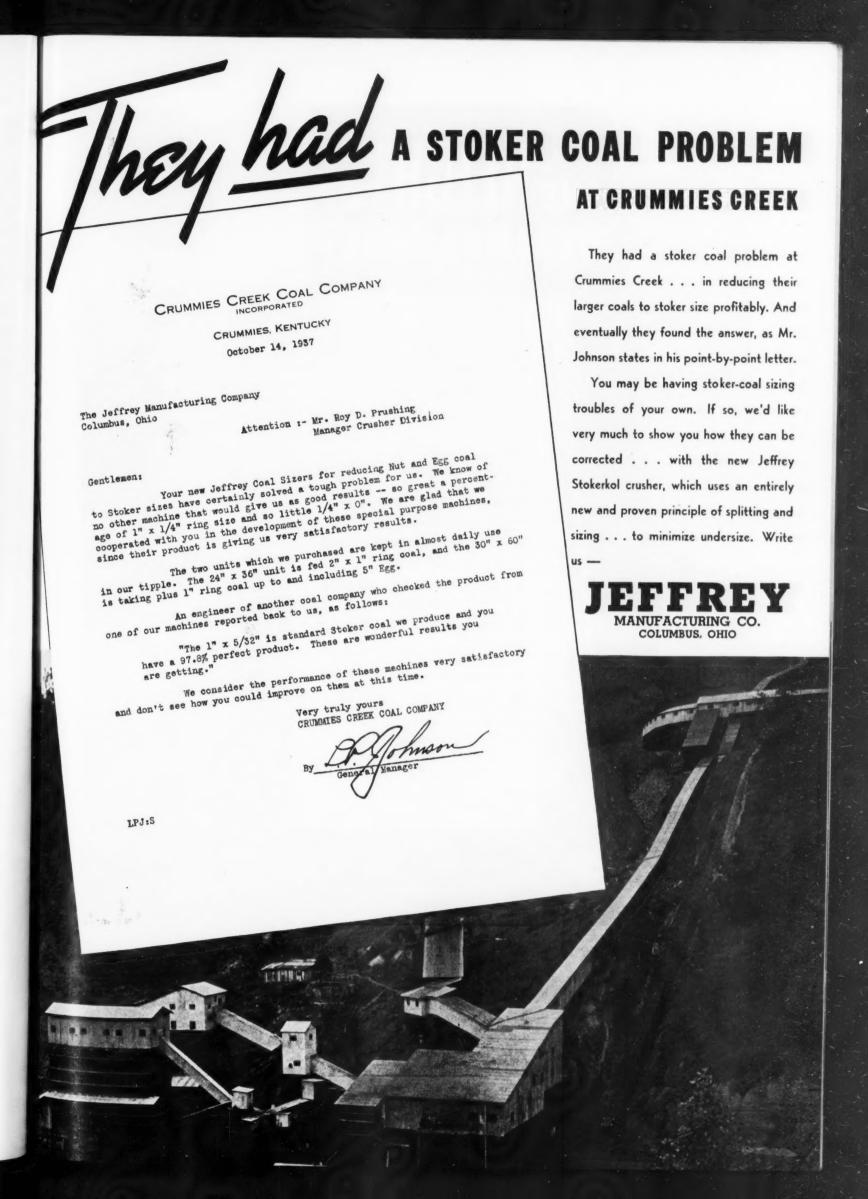
Not only have SEF Bearings sufficient merit to win first place with designers of new equipment, but they are used for replacement by coal operators as well.

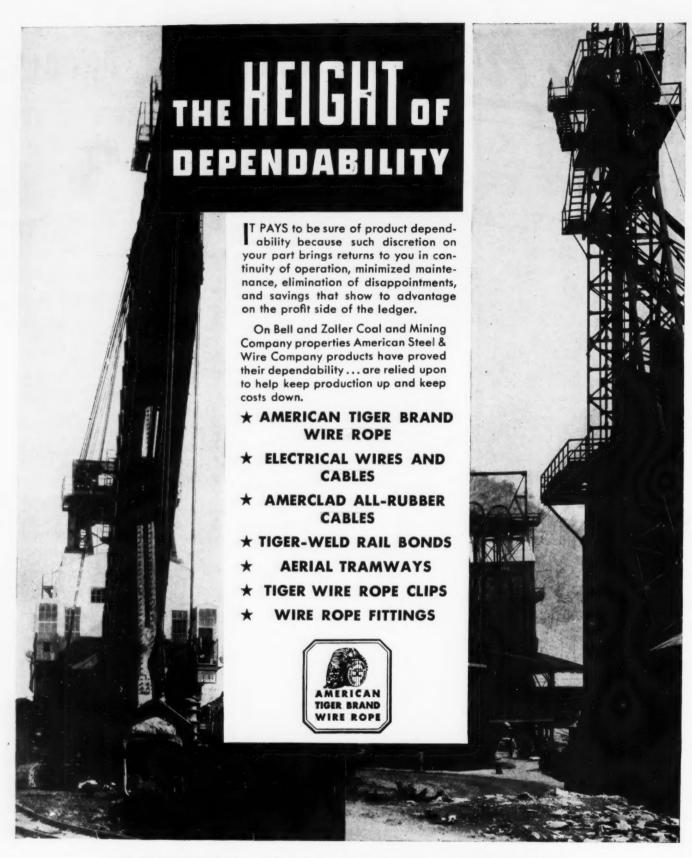
Permitting free lubricant circulation to all bearing parts under varying operating conditions, BRF Bearings are in a class by themselves. See your nearest BRF distributor for further details, or write direct.

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.











Cleveland, Chicago and New York For Anthracite Service: Miners Bank Bldg., Wilkes Barre, Pa.

COLUMBIA STEEL COMPANY

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United States Steel Products Co., New York, Export Distributors

UNITED STATES STEEL

In Dollars...



Condor Conveyor Belt on T. V. A. construction handling rock. 522 feet long, 30 inches wide, 7 x 9 ply.

or Pesos...



South American copper mine equipped with Manhattan Conveyor Belts.

MANHATTAN CONVEYOR BELTS Build Profits



Transmission Belt V-Belt Conveyor Belt Air Hose Contractors Hose Sand Blast Hose Suction Hose Fire Hose Hydraulic Hose Steam Hose Water Hose
Chute Lining
Launder Lining
Industrial Brake Lining
Molded Rubber Goods
Rubber Lined Tanks
Rubber Covered Rolls

Abrasive Wheels — Rubber Bonded Judged by any work or monetary standard, Manhattan Conveyor Belts mean but one thing — extra value. Extra value because they last and last — repeatedly establish high-tonnage and low cost-per-ton records. Perhaps that's why Manhattan Conveyor Belts are found in many countries... in every kind of service.

Typical of this extra value is Condor Conveyor Belt. Performance—long life, freedom from maintenance troubles and low ultimate cost—has been built into this belt as a result of Manhattan's exclusive Homo-Flex Construction. The component parts of the belt are combined into one homogeneous unit; covers and fabric are tied into one mass to withstand the severe service of mines, quarries and construction work. Six advantages result:

- Extreme flexibility troughs naturally, even in thick ply and long narrow belts.
- 2. Reduces stretch to a new minimum.
- 3. Gives longer belt life due to complete bonding of every member in the belt into a homogeneous structure.
- 4. Ply separation is eliminated.
- 5. Inseparable wear-resisting covers.
- 6. Resists puncture to a high degree.

Consult Manhattan's engineers on your next conveyor belt installation. 44 years' experience in building "the right belt for the job" enables them to make specific recommendations for all kinds of materials and conditions.





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OF RAYBESTOS-MANHATTAN, INC.

EXECUTIVE OFFICES AND FACTORIES, 14 TOWNSEND ST., FASSAIC, N. J.

